

ORGANIC LIVESTOCK FARMING

• Mahesh Chander • B. Subrahmanyeswari



Indian Council of Agricultural Research
New Delhi



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PREFACE

This publication pays rich tribute to ancient wisdom of agricultural production and animal husbandry; also it recognizes the contribution of modern intensive agricultural production systems, since both these systems have ensured health and welfare of human beings and animals, while mitigating hunger in their own unique ways. Keeping pace with the times, now, the agriculture is increasingly being governed by knowledge and skills, not only in terms of production and processing but also in line with the global trends, consumer preferences and market situations. It is the consumers now who are going to determine what and how farmers should produce and market forces would decide the price of the products, not the governments. The changes on these lines are taking place with more rapid pace now as the means of communication like ICT are changing the dynamics of human life and businesses in different sectors. To keep pace with the changing times and requirements, organic agriculture as an emerging sustainable alternative to the input intensive conventional system of production is rapidly gaining acceptance all around the world. In the last ten years, organic agriculture has witnessed tremendous growth and the trend is likely to continue for many more years. The developing countries like India too are responding to this organic revolution, which is shown by the rapidly increasing production and exports figures of organic agricultural products in India. Yet, barring a few sporadic experiences, organic livestock production *per se* has not yet made a formal beginning in this country.

The Research and Development institutions as also the Non-Governmental Organizations, private sector and enterprising farmers in India are exploring the possibility of organic livestock production. To this end, they often look towards the academic institutions and researchers for the appropriate reference material, but literature on organic livestock farming suitable to Indian conditions is rarely available. As such, the need for a reference book on organic livestock farming was clearly felt by the Indian Council of Agricultural Research, thus, this book came into being.

We have chosen to include and touch upon the issues, which are most relevant for the academicians and researchers who wish to gain initial understanding of the organic livestock farming. We have covered the organic standards concerning animal husbandry developed by the International Federation of Organic Agriculture Movements (IFOAM), USA, European Union, Codex Alimentarius Commission, Chinese organic standards and East African Standards apart from the National Standards of Organic Production (NSOP), developed by the Agricultural and Processed Food Products Export Development Authority (APEDA) under the Ministry of Commerce, Government of India. These standards are to be referred by

the trainers and practitioners of organic farming in India, especially when they intend to market and particularly for exporting the products, the organic products have to be compliant to the standards of the importing countries. As the organic livestock farming is yet not developed much, practical experiences are obviously lacking as of today. Still, we have tried it to make a useful experience for the readers who can later build upon towards giving a more formal shape to the organic animal husbandry development in India. We are confident that this book would significantly contribute towards improved understanding of organic livestock farming, thus, help in developing a sustainable roadmap for the development of organic animal husbandry in India.

We know that it is only a small step towards understanding the organic livestock farming, which is an evolving system of food production requiring attention of academicians, scientists, extension professionals, development workers and farmers. A lot more knowledge, skills and methods are required to develop it further towards sustainable organic livestock production. In our endeavour to write this book, many individuals helped us, especially the research team of the project, “A SWOT analysis of organic livestock production in India” namely Drs Sanjay Kumar, R S Rathore, H N Pandey, S K Mondal, N Kondiah and Reena Mukherjee helped us to a great extent. Besides, the scientists and students of the IVRI were our source of motivation and encouragement. Also we have liberally used the information available in public domain. We gratefully acknowledge all these sources of information and inspiration. The present and past Directors of Indian Veterinary Research Institute, Izatnagar especially Dr M P Yadav have been quite encouraging and supporting, for which we are thankful to them. Finally, we gratefully acknowledge the Indian Council of Agricultural Research and Directorate of Knowledge Management in Agriculture (DKMA), for publishing this book.

Mahesh Chander

B Subrahmanyeswari

“Organic farming isn’t about turning back the clock, it’s about moving forward.”

- Dr David Suzuki

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1

Animal Husbandry in Ancient India - A Tribute

Every country has its own reasons to be proud of its glorious past in diverse areas of human development including agriculture and animal husbandry. Indians too take pride in India's ancient history, culture, customs, traditions, wisdom and practices followed by their ancestors. The ancient agricultural and livestock production systems in India were organic in their own ways, since it was much closer to the modern concept of organic farming, which resurfaced only after experiencing the bad effects of intensive production practices invented and followed by western industrialized countries, which spread all across the world. Indian traditional system of agricultural production and animal husbandry has rich heritage, in fact, it is believed that it was quite vibrant and milk and honey was used to be produced in abundance. In India, historically agricultural tradition is 10,000 years old. In ancient literature, during 1000 BC in the Vedic period, it is mentioned that productivity of paddy/ha was 60 quintals. The agricultural practices being practiced since centuries were solid, sustainable and quite modern in their own ways, of course without agrochemicals, tractors and other energy consuming machines. The principles and practices of agricultural activities followed in those ancient times are, in fact, being repeated in the form of organic farming, albeit with better documentation, sophistication and blending with scientific knowledge in the era of IPR and Patenting.

A great variety of recorded production systems for both crops and livestock have been practiced in India over the period of time. Through these practices, the country evolved fine breeds of livestock, particularly in case of cattle and horses. These unique resources of livestock breeds were used by Indian farmers for multiple purposes, viz draught, milch and dual purpose. Some of cattle breed like *Amritmahal*, *Hallikar*, *Khillar*, *Ongole* and *Haryana* have their importance as excellent draught or dual-purpose breeds. They are being sought in other countries as well for their special characteristic of disease resistance. Indian breeds like *Gir* and *Sahiwal* are among the hardiest of high yielders in the world. The virtues of Indian breeds need special emphasis, thus, it has been discussed separately in this book. The traditional approach to breed improvement was aimed at meeting the requirements of local communities with due consideration to local resources. This is one of the main reasons for high adaptability of indigenous breeds. The ancient people were also very careful on maintaining the specific characteristics of the breeds by following

controlled breeding system. Even during those days attempts were made to infuse the good qualities of other breeds which is evident from the history of breeds. There are evidences to suggest that breed improvement was never taken up in isolation but always linked to housing, nutrition and hygiene. The best-breed male cattle used to be donated to temple trusts and they enjoyed wide patronage. These trusts had grazing lands for the cattle owned by the community. The grazing lands were regarded as Common Property Resources and were nurtured for that purpose. Stray, unknown bulls were not allowed to mix with the herd to maintain purity of the breed. Plenty of instances have been documented about not only the elaborate breeding methods, but also about the treatment of animals using local herbs and other resources.

In ancient Indian literature, evidences are available about punishment for inflicting injury to animals. The ancient Aryans had always born in their hearts a tender solicitude for the well being of their cattle. They were very systematic in their approach, thus, laid down specific rules and formulas regarding construction and sanitation of the cow stall, keeping and employing cattle, their diseases and treatment etc. Some of the beliefs of the people in Aryan period were:

- A cattleshed should be fifty-five cubits square, and it should never be erected when the sun enters Leo, i.e. in the month of *Bhadra*.
- One who makes his cattle shed strong and keeps it clear from dung secures a healthy growth for his animals.
- Goats should not be kept in the same shed with cows.
- Rice washing, cotton, husks, hot starch, broomstick, pestle, or spoiled food should never be kept in the cow-shed.
- To safeguard against breaking out of diseases, the cow house should be occasionally fumigated with vapours of *devadara* (*Pinus deodara*), vaccha (Oriss root), pulp of fruits, gugulla (*Commiphora wightii*)- a fragrant gum, asafoetida and mustard seeds mixed together.
- A *Pinyaka* tree (asfoetida) should be planted in the cow house to improve its general sanitary condition.
- Hungry, thirsty, tired, deformed or diseased cattle should never be yoked to the plough.
- Breeding bulls to be fed *masa* (*Phaseolus radiatus*), sesame, wheat, clarified butter, the cream of milk and salt.

In ancient India, to take good care of diseased animals and animals which were no longer economically important to the owners would be send to *Gaushalas*, Pinjarpoles. It is a good animal welfare practice prevalent since centuries in India.

Taking cues from this ancient practice, the Government of India under its scheme on Gosamvardhan, *Guaushala* and other conservation measures allocated resources to maintain livestock in *Gaushalas* and Pinjarpoles. Many religious trusts also run *Gaushalas* for abandoned, diseased, old cattle. These *Gaushalas* may serve as the centers for preaching on animal welfare – an important pillar of organic livestock farming.

A review of ancient Indian scriptures, especially the *Vedas*, shows that amongst the nomadic, pastoral Aryans who settled in North-western part of India, animal sacrifice was a dominant feature till the emergence of settled agriculture. Cattle were the major property during this phase and they offered the same to propitiate the Gods. Wealth was equated with the ownership of the cattle. It was in 1946 that the Animal Husbandry Wing of the Indian Council of Agricultural Research recognized the potentiality of the valuable work done by *Goshalas* and Panjarapoles and recommended a plan to encourage them to be the fountain-heads of milk and draught power in the country. They formulated a plan to constitute statewide federations of *Goshalas* and *Pinjarpoles*.

The *Gaushala* movement is synonymous with the protection of cows and cattle wealth of India. Being practiced for the last five thousand years or so, its origin can be traced in the Vedic period when social customs and rules laid great emphasis on protection, preservation and development of cows for home, and oxen for agricultural fields. According to Vedic concepts, cows were considered sacrosanct and constituted material and spiritual assets of the people of the country. At that time, possession of herds of cows was the yardstick for measuring economic esteem and prosperity of an individual. Thus, ‘*Shatagu*’ was the owner of hundred cows. One who possessed one thousand cows was referred to as ‘*Sahastragu*’ with honour. Among *Jains* (0.4% of Indian population) Agams and scriptures, the principal disciples of Bhagawan Mahavir have been referred to as having several *Gokuls*, each *Gokul* containing 10 thousand cows. ‘*Rigveda*’ refers to cow as ‘*Aghnya*’- or one which must never be killed. ‘*Yajurveda*’ states- ‘*Go matra Na Vidyate*’ – which means that there is no parallel to the cow in this world. ‘*Atharva Veda*’ considers cow as the ‘house of prosperity’- ‘*Dhenu Sadanam rayinam*’. The Rishies (Ascetics) maintained *Asharam Gaushalas*, with hundreds of milking cows. It was the milk and milk products from these *Gaushalas*, which helped them to offer hospitality to visitors. Cow being the backbone of rural life and economy in India, care was taken for their well-being and uplift. Grazing areas and grasslands (*Gochar Bhumi*) were kept reserved in abundance everywhere. People used to donate their lands to *Gaushalas* on auspicious occasions so that cows may have sufficient land for grazing. Grazing is being emphasized in organic farming now.

The western model of industrialized production of livestock, with tremendous increase in productivity is now increasingly being criticized for its adverse effects. Thus, in search of more sustainable forms of livestock production, it is important to

revisit ancient practices. Kautilya's *Arthashastra* is one good treatise among others for livestock management in those days (321-296 Bc), at about the same time as Aristotle, the Greek philosopher (384-322 Bc). Man's keen interest for sustainable livestock development has been well illustrated in Kautilya's *Arthashastra*. It contains an elaborate analysis regarding various aspects of livestock with prescriptions for their better management. He was also highly conscious about the benefits man gets from different species of animals. Both domestic and wild animals were well protected during Kautilya's time. Pain and death to animals were considered as a serious offence and people involved in such unkind acts were punished with fine. Protection and care of animals was a permanent consideration in Kautilya's view. He suggested appointments of the superintendents of cattle, horses and elephants. He had also set forth the duties and rights of the superintendents. The kings were assigned the duties of maintaining pastures required for grazing domestic cattle. He prescribed, "the king shall make provision for pasture grounds on uncultivable tracts". Census of cattle was an important responsibility of the superintendent who would collect and register detailed data regarding cows, oxen, buffaloes, and their offspring. The livestock used to be branded for different purposes as per their utility and stages of productive life. Penalties for reckless grazing and harm to animals were well defined, as also the owners were punished if their animals caused harm to other animals and human beings. Nutrition, feeding and health care of livestock, slaughtering of animals, marketing of livestock have been well elaborated in the Kautilya's *Arthashastra*. Selling of flesh of livestock, killed outside the slaughterhouse, was punishable. Similarly, selling of flesh of animals after their sudden death was a penal offence. The offenders were punished with a fine of 12 *panas* for both the offenses.

Kautilya's *Arthashastra* is not a treatise on livestock only; it is only a small part of whole lot of things concerned with socio-economic and political life mentioned in it. It is amazing to note that Kautilya had indicated in great detail the dietary requirements of bulls, milch cows, calf, oxen, horses etc. The diet would include combinations of meadow grass, ordinary grass, oil cake, bran, salt, curd, oil or *ghee*, sugar, jaggary, ginger in different proportions for different categories of animals. These basic principles of livestock management may still hold well with needed contemporary modification through research. Many ancient Indian scriptures including the Kautilya's *Arthashastra* are being used by the management institutions for teaching management principles. Likewise, agri-universities, agri-research institutions may include the livestock management in ancient India as an essential course especially at under-graduate level. Also, research may be taken up on these aspects. Already, some scholars have initiated work in these areas for dissertations. Organic livestock farming system can benefit from this ancient wisdom since; many of the practices are common in both the systems.

Indigenous Technical Knowledge (ITK) in Animal Health Management – A Gift from Ancestors!

Rich tradition of indigenous knowledge exists in several countries of the world having ancient civilization, India is one of them. In India, veterinary medicine was practiced as early as pre-Vedic time, which preceded development of human medicine. It is speculated that primitive human medicine was learnt through observing behaviour of sick animals and the same physician treated both human and animal ailments. *Rig-Veda* (2000-1400 BC), the oldest repository of human knowledge, provides the first literary evidence of existence of veterinary cult in India. Subsequent references are also given of veterinary practices in *Yajurveda* and *Atharva-Veda*. Vedic Aryans were primarily pastorals and grazed their cattle in jungles. Cow was adored and considered by the Vedic people as the source of good fortune, happiness and good health (*Rig. 6-28.1, 6*). A number of hymns in *Rig Veda* are addressed to *Indra* for gifts of cattle, which was a symbol of wealth. 'Indra grants us wealth of barley by means of cattle' (*Rig 10.3.13.7*). 'May we escape poverty by means of cattle'? (*Rig.10.4.2-10*). The sixth *Anuvaka* of the 8th *Mandala* of *Rig Veda* related entirely to the liberal gifts in form of horses, camels, brown mares and cows with red patches (*Rig 8.6.4.22*). Milk was an important component in diet of Vedic Aryans. Cows were milked three times a day. Oxen were used for transport and flocks of sheep and goats were kept for wool, which was spun and woven by women on loom.

The ancient books written by *Salihotra* (1800 BC) and *Charak* (2300 BC), and *Palikapaya* (1000 BC) describe treatment of animal diseases using medicinal plants. The ancient Indians also had distinction to establish the first state funded well-equipped veterinary hospital during the period of the Great Ashoka (238 BC) and *Shalihotra* is considered to be the first known veterinary doctor in the world lived around 1800 BC in India, undoubtedly he was the first known veterinarian in India at least. In fact, he gave his name to veterinary medicine (*Salutri*) and to veterinary doctors (*Saluter*) in India.

The term Indigenous Knowledge (IK) refers to the unique, traditional, local knowledge existing within and developed around the specific conditions of people indigenous to a particular geographic area. The Indigenous Technical Knowledge (ITK) is specifically concerned with actual application of the thinking of the local people in various operations including agriculture and allied areas. The striking difference between traditional knowledge system (TKS) and Western System of Science (WSS) is that TKS regards natural world as animate and all life forms as interdependent. In WSS, human life is generally regarded as superior, with a moral right to control other life forms. Thus, the TKS are eco-friendly and sustainable, whereas WSS favours men's greed to exploit natural resources. Further, ITK is generated and acquired through observation and practical experience and knowledge

in WSS is learned in a situation, which is remote from its applied context. The traditional knowledge is specifically concerned with actual application of the thinking and experiences of local people for an area and, as such is generally cost-effective. The traditional technologies are appropriate for the circumstances of many, if not the majority of livestock owners in the tropics. In animal husbandry, ITK has been used for feeding, breeding, housing and health management. Some of these practices such as the ethno-veterinary medicine may be of particular value in providing animal health care at farmers' door and achieving sustainable animal husbandry.

Traditional skills and knowledge have been neglected in intensive agriculture. Organic agriculture, on the other hand, has always been based on practical farming skills, observation, personal experience and intuition. Knowledge and experience replaces or reduces reliance on inputs. This knowledge is important for manipulating complex agro-ecosystems, for breeding locally adjusted seeds and livestock, and for producing on-farm fertilizers (compost, manure, green manure) and inexpensive nature-derived pesticides. Such knowledge has also been described as a 'reservoir of adaptations' (Tengo and Belfrages 2004).

Some Promising Veterinary ITK Practices

Large number of ethno-veterinary practices are used in India for management of animal health. These practices are based on locally available materials with minimum or no use of chemical inputs. Plants and herbs available in a particular area are generally used for management of common diseases. The technique for the same condition may vary from region to region or even within one region. The efficacy of these practices is also variable and at times questionable too. The Indian Council of Agricultural Research (ICAR) launched a World Bank funded Mission Mode National Agricultural Technology Project (NATP) in 1998 on 'Collection, Documentation and Validation of Indigenous Technical Knowledge (ITK)', to document and scientifically validate ITK including ethno-veterinary practices. Under this project, a total of 595 ethno-veterinary practices were collected from different sources and 48 were recommended for scientific validation. Many of these showed therapeutic and ameliorative potential. In another NATP on 'Identification and evaluation of medicinal plants for control of parasitic diseases in livestock' 158 plants were catalogued and 50 were evaluated for anti-parasitic activity. Their efficacy depends on the phytochemistry of the plant ingredients. National Innovation Foundation (NIF), an autonomous institution based in Ahmedabad supported by Department of Science and Technology (DST), has developed a huge database of ITK and grassroot innovations collected from the length and breadth of India. The NIF was established by the DST on 28 February 2000, with the main goal of providing institutional support in scouting, spawning, sustaining and scaling up grassroots green innovations and helping their transition to self-supporting activities. Likewise, many NGOs too are involved in collection, documentation and value-

addition of ITK. These institutions, both from government and non-government sectors are involved in a big way to develop green technologies through researching on ancient or farmers' practices.

Common conditions for which the traditional medicines are generally used in India include gastrointestinal disorders such as indigestion, bloat, diarrhoea and constipation, mastitis, internal and external parasites, skin ailments, reproductive disorders, joint swelling, yoke gall, wounds, respiratory problems and debility etc. Validation of some of the traditional practices used for these conditions has indicated their potential value, especially as an adjunct therapy. In addition to treatment of common ailments, Indigenous Knowledge is also used for effective feed and feeding practice, livestock shelters and value-addition to livestock products. All such local methods have potential use in organic management of livestock provided these are tested, validated and found fit or compatible to the guidelines for organic livestock production.

Indigenous knowledge is fast disappearing from peoples' practice, particularly amongst younger generation of farmers. Ethno-veterinary medicine, while found effective against a wide range of uncomplicated common diseases, these can not be a substitute to comprehensive animal health care and management system. The ethno-veterinary medicine is becoming a growing area of research and more and more scientists, veterinary professionals and livestock owners are becoming interested in indigenous medicinal plants. The traditional medicine system appears to be viable solution for providing cost-effective primary health care to animals in rural India, where modern drugs are not readily available. However, several challenges need to be addressed to make the traditional knowledge more effective, farmer friendly and economically viable in the changing agro-climatic conditions of the country. Further, the promotion of ITK in veterinary practice and to achieve sustainable livestock development requires the understanding that ethno-veterinary medicinal products consist of more than just medicines. It includes also management practices; information about diseases, animal production and breeding; tools and technologies — in short, the whole system that local people, through trial and error and also deliberate experimentation, developed to keep their animals healthy and productive. The relevance of ITK could be realized only when it is applied within a larger holistic farming system perspective encompassing land, livestock, and agriculture. Ideally the researchers should learn about a community's ethno-veterinary system and practices before introducing anything from the outside. The solutions to the problems should be found from the within first, as the ancient people used to do and as also the organic farming principles emphasized now.

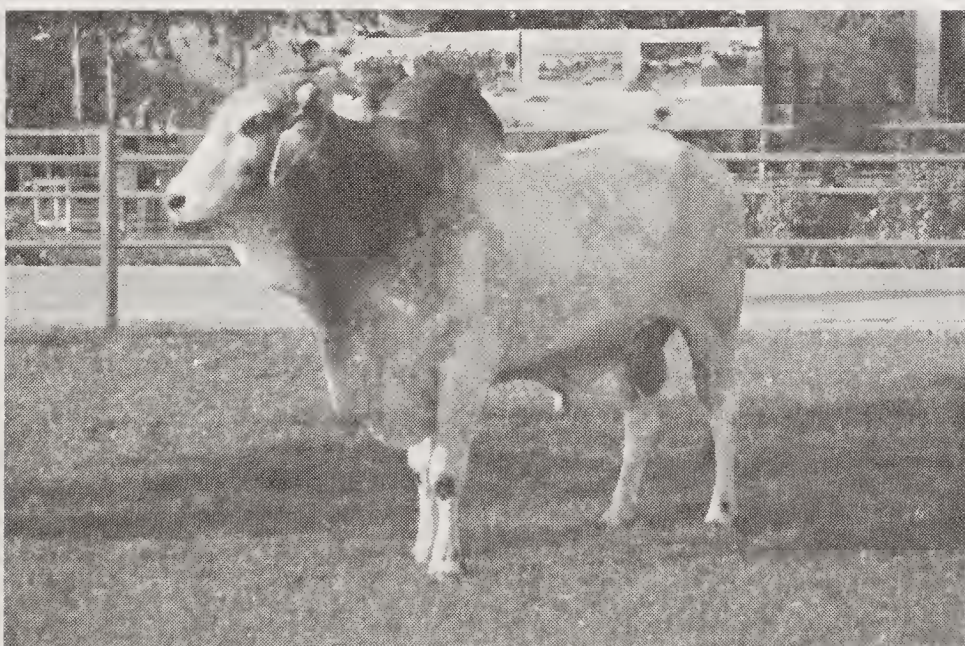
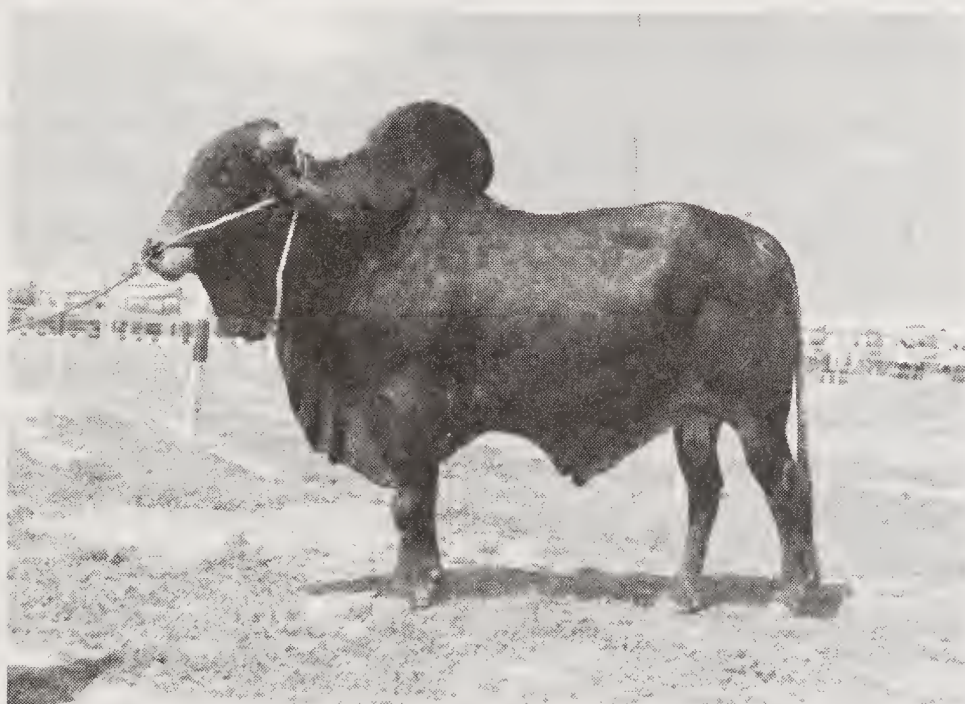
Looking Back to Look Forward

Sir Arthur Olver, a veterinarian and the then Animal Husbandry expert to the Government of India, appointed by the Royal Commission on Agriculture, was the

greatest missionary of cow in India, who saw a tremendous potential in Indian cows as early as 1930's (Sir Arthur Olver (1875-1961) Foundation fellow, Biographical Memoirs of fellows of the Indian National Science Academy, 1992, vol 16, 91-98). He observed that there is need to systematically improve the cows of best indigenous breeds with proper care and strict selection, their potential can be raised to the levels of milk production even exceeding those of good dairy herds of European cattle in this or other countries. The Royal Commission on Agriculture (1926) recommended that Public sector should concentrate only on improving indigenous breeds like Sahiwal, Red Sindhi and Haryana. Similarly several other workers strongly opposed adoption of large-scale crossbreeding programme and suggested steps should be taken to improve milk production potential of indigenous cattle. Such observations have become more valid and relevant today when many more experts feel in favour of native cattle. Taking note of these suggestions, the ICAR, on the recommendations of *Goseva Sangh* (1949), also recommended that the milking capacity of well-defined breeds of cattle should be improved by selective breeding. These breeds were to be utilized for the development of cattle in underdeveloped areas. Therefore, urgent steps are needed to focus more on the local livestock resources available in India, for developing sustainable livestock production systems suitable to Indian conditions. Importance of local resources can be understood by the fact that the proportion of crossbred population has remained below 15% in India despite crossbreeding efforts since late 1950's. This indicates that given the high adaptability of Indian cattle and availability of resources with Indian farmers only local cattle would sustain and perform better, not the so called high yielders with exotic inheritance, requiring more feed, fodder and other maintenance costs.

Native Indian Cattle Breeds: Do They Need Crossing with Exotic Breeds!





Tharparkar bull at IVRI cattle and buffalo farm

The ancient Indian livestock management practices may be still as relevant as such or with blending of modern knowledge depending on the availability of more sustainable technologies, changing situations and requirements of time. In order to do so, careful collection, compilation, validation for its current usage and scientific basis of its application is required to be studied. The following aspects need attention to make best use of the ancient wisdom properly blended with modern scientific knowledge:

- Keeping and maintenance of old, diseased, handicapped, unserviceable animals in *Gaushalas/Pingarpoles* with active partnership of people and government for which ancient Indian literature have enough evidences.
- Animal welfare measures by protecting them from cruelty and ensuring sufficient quantity of ration as per the dietary requirements of the different categories of animals.
- Maintaining hygiene, disease management and ensuring sanitation of cattle sheds using fumigation, washing etc.
- Creating space for animals so that they can exhibit their natural behaviour. For example, rooting behaviour in pigs which give them pleasure. Under intensive systems of production, such natural tendencies of animals are suppressed.
- Grazing should be systematic, regulated and paid for if needed to conserve the natural resources. In ancient India, and even now livestock depend on grazing which is considered to be a good practice but grazing lands are on the decline. Something has to be done in this regard. It calls for a collective action of people at village level since there has to be a balancing between natural resource management and sustainable livestock development.
- Breeding of animals should not be erratic, uncontrolled. It has been very systematic in ancient India and also the modern science recommend for controlled breeding of animals. It is perhaps one of the most important issues for consideration. Uncontrolled breeding has led to several problems in India including proliferation of large number of unproductive animals that put pressure on grazing lands and create other problems in scientific management of livestock.
- Livestock health management needs attention especially to minimize the use of antibiotics and allopathic medicine, which not only affect the health of the concerned animals but also move to human body and also pollute the environment. The possibility to minimize their use needs to be explored by use of traditional practices through proper validation.
- Religious institutions need to be persuaded to focus their attention to the

larger interest of animal welfare issues including their feeding, health and upkeep rather than on narrow considerations. These institutions should emphasize that it is important to keep animals in good conditions with proper hygiene, sanitation and feeding, as we need for ourselves since animals ultimately serve our purpose only. The old traditions of good livestock management may be revived through religious and cultural organizations. These organizations may keep animal welfare as one of their goals.

- Animal welfare and role of animals to human society need to be highlighted by incorporating teaching material in the syllabus of Nursery and junior schools. In the curriculum of agriculture and veterinary sciences at the undergraduate levels in particular, the livestock management in ancient India and its relevance in modern context should be taught. For this text books need to be written carefully.
- Research is needed to validate the importance of the many of the ancient practices so as to establish, if these practices are still relevant.

Taking clues from the ancient wisdom, we can move forward with our indigenous systems with full confidence aiming to assess, refine and improvise the technologies to suit new environment and requirements of time, while reducing the reliance on



Local breeds are fit for small scale agricultural operations



external inputs and technologies alien to the country. India's glorious history of its animal resources and ways of rearing them can give us enough strength on our own to move forward with modern concept of organic farming as elaborated in this book.

The Organic Tradition in India

Most of the people in India while discussing matters concerning organic farming express with confidence that Organic farming is nothing new to India as it was practiced in India since thousands of years in a class of its own. It's a common belief that the great Indian civilization thrived on organic farming and was one of the most prosperous countries in the world, till the British ruled it. In ancient India, the entire agriculture was practiced using organic techniques indigenous to India evolved over the years by Indians, where the fertilizers, pesticides, etc., were obtained from plant and animal products. Organic farming was the backbone of the Indian economy and cow was worshipped (and is still done so) as a God. The cow, not only provided milk, but also provided bullocks for farming and dung which was used as fertilizer. The Gods and Goddesses were associated with some type of animals. The formal institutions to conduct research on ancient Indian practices were not much developed so the knowledge possessed by the farmers could not be

further refined and effectively developed for wider application. The rich tradition of organic farming gradually died in India, replacing it to the input dependent expensive agricultural practices.

Shift to Chemical Farming in 1960s

During 1950s and 1960s, the ever increasing population and several natural calamities/famines led to a severe food scarcity in India. As a result, the government was forced to import foodgrains from foreign countries. The Government had to drastically increase the production of food in India in a short period. The Green Revolution became the government's most important programme in the 1960s. Large amount of land was brought under cultivation in which hybrid seeds were sown. Indigenous cattle breeds were crossed with exotic breeds. Natural and organic fertilizers like farmyard manure (FYM) were replaced by chemical fertilizers and locally made pesticides were replaced by chemical pesticides. Large chemical factories such as the Rashtriya Chemical Fertilizers were established. The Green Revolution, within a few years, showed its impact. The country, which was greatly dependent on imports for its food supply, reduced its imports every passing year. By 1990s, India from food deficit situation country became a foodgrains surplus nation and once again became an exporter of foodgrains. The green revolution as well as white revolution are the great examples of food revolution quoted world wide for their achievements in making India food self-sufficient country.

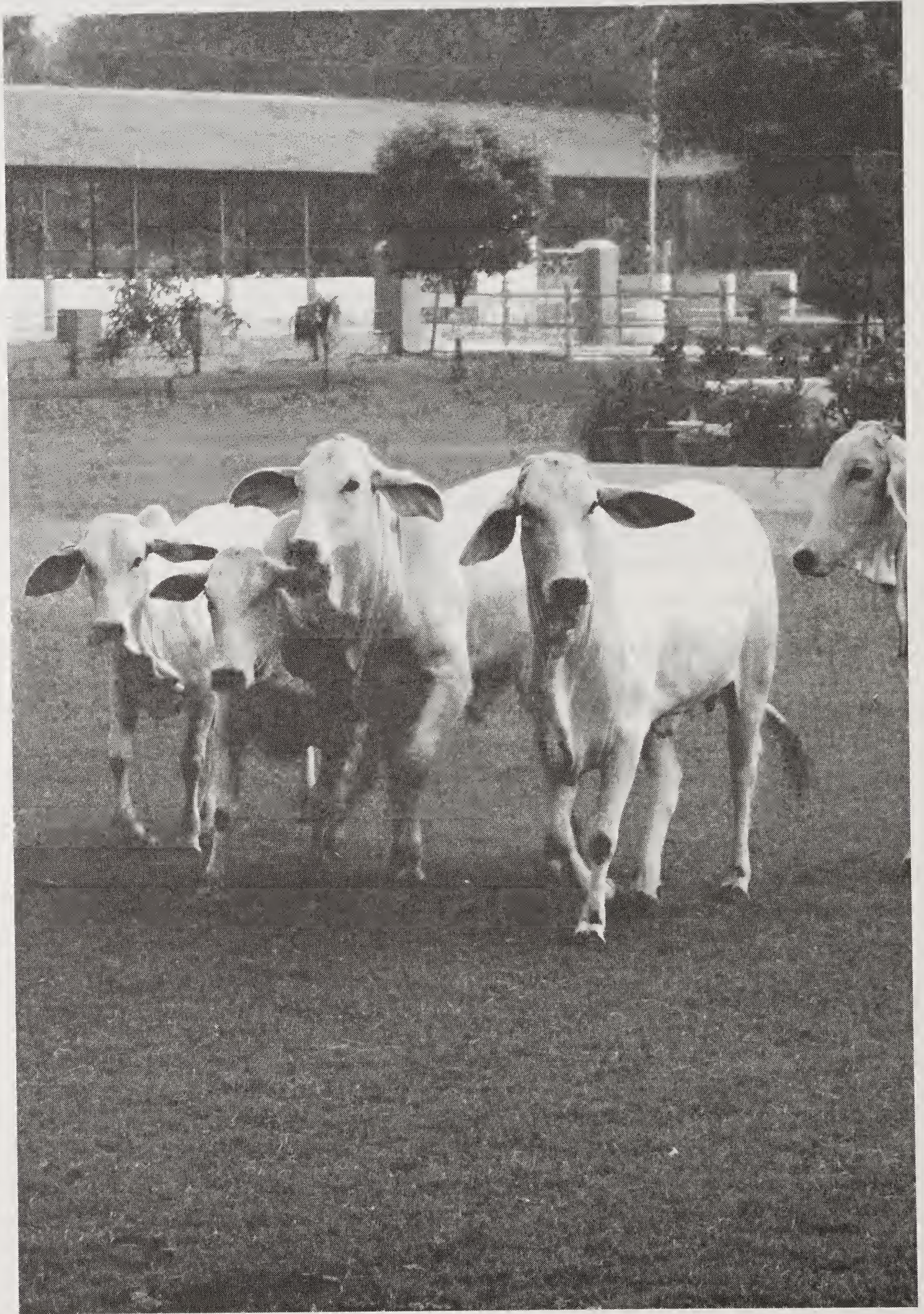
As time went by, extensive dependence on chemical farming has shown its darker side. The land is losing its fertility and is demanding larger quantities of fertilizers to be used. Pests are becoming immune requiring the farmers to use stronger and costlier pesticides. Due to increased cost of farming, farmers fall into the trap of money lenders, who exploit them no end, and forcing many to even commit suicide. The areas where inputs like pesticides dependent cash crops are the mainstay of the farmers, like cotton growing districts of Maharashtra were more affected by the farmer suicides. The farmers maintaining livestock suffered less from the onslaught of drought and debt compared to the farmers growing input intensive cash crops like cotton.

Back to Nature

Both consumer and farmers are now gradually shifting back to organic farming in India. It is believed by many that organic farming is healthier. Though the health benefits of organic food are yet to be proved, consumers are willing to pay higher premium for the same. Many farmers in India are shifting to organic farming due to the domestic and international demand for organic foods. Further, stringent standards for non-organic food in European and US markets have led to rejection of many Indian food consignments in the past. Organic farming, therefore, believed to be a better alternative to conventional chemical oriented farming. Thus, many agencies

ORGANIC LIVESTOCK FARMING

including government organizations are promoting organic agriculture including organic livestock production and dairying in India as elsewhere in the world.



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Organic Farming: An Introduction

Agricultural production systems have gradually evolved and developed over a period of time from the age of hunting, gathering, shifting cultivation, settled agriculture, intensive production to today's organic farming. History of agriculture is a long journey of innovation, trials and tribulations of humans to produce food for themselves and their livestock. Before 19th century, food used to be produced using manures and horses and oxen were the major sources of farm power since chemical fertilizers, pesticides, and tractors or farm machines were not invented till then. With advancement of science, agrochemicals, nitrogen fertilizers, tractors, seed drills, pesticides etc were invented. By the middle of the 20th century, most of the components of modern agriculture, i.e. tractors and associated farm machines, fertilizer and agrochemicals became popular on agricultural farms in the developed world. These chemicals and machinery constituted the modern agriculture now can be described as conventional agriculture, which revolutionized the agricultural production scenario leading to manifold increase in agricultural productivity not only in developed countries, but developing countries too could reduce hunger because of these agrochemicals and machines. Anyone would agree that this modernized agriculture has been of great help in alleviating hunger from the world, because the world population more than doubled itself during the last half of the 20th century; it increased from 2.5 billion in 1950 AD to 6 billion in 2000. It is predicted that the world population will again double itself by the end of the 21st century and will touch the 12 billion mark. Most of this increase in population has been, and will be, in the developing countries in Asia, Africa and South America. Modern agriculture with all its components, thus, is going to continue a little longer to ward off hunger from developing countries.

India's own achievements in agricultural production after the Green Revolution in the mid-1960s, has been exemplary and mainly due to increased use of the components of modern agriculture, namely high-yielding varieties, fertilizer, pesticides and farm machinery. Foodgrain production in India more than doubled itself during the post-Green Revolution period with virtually no increase in net cultivated area; it increased from 95 million tonnes in 1967–68 to 235.88 million tonnes in 2010–11. Tremendous increase in agricultural productivity and production notwithstanding, overuse of pesticides, especially in vegetables and fruits, resulted

in residues above safety levels, and this brought to attention the ill-effects of modern agriculture; even drinking water was not spared. Soon the ill effects of overuse of chemical fertilizers were recognized in Europe, USA and more recently even in India. These were nitrate enrichment of groundwater; river waters and estuaries and release of ammonia and nitrous oxide to the atmosphere; the former added to the problem of acid rain, while the latter led to the reduction of ozone layer. The ill-effects like greenhouse gases, global warming largely attributed to chemical oriented agriculture forced people, especially in western industrialized countries with high-incomes to demand food grown without fertilizers and pesticides. This led to the search for the alternatives to chemical based agriculture, which paved the way for organic farming. Organic farming formally came into being following gradual developments over the period of time. It is still evolving with advancing times, with different nomenclatures, viz. biological, ecological, bio-dynamic, organic and natural agriculture.

The Genesis

There is multiplicity in the definition of organic farming as also in the ways people perceive it. For most of the people, the agriculture practiced by the ancient people was organic farming since it was close to nature, thus, 'natural farming'. It might be true when we take into account only a few aspects like growing crops and raising animals naturally, non use of chemicals, availability of grazing lands etc. Nature farming and organic farming are often used as synonymous but these too differ so much so that these two are two different schools of thought having their respective followers in different parts of the world.

The organic farming in modern sense as it is considered in this book is much more than the non use of agrochemicals. The roots of organic farming can be traced to Europe back to the late early 20th century. The Austrian philosopher and scientist Rudolf Steiner (1861-1925) was perhaps the first person to outline an alternative system including farm animals, who introduced a trademark 'Demeter', for food produced in biodynamic farming systems. In 1924, he held a series of lectures on agricultural production methods that were transcribed and published (Steiner 1929). These lectures were the beginning of what today is biodynamic farming. The first biodynamic farms were then established in Europe in the late 1920's. The biodynamic farms include farm animals and provide guidelines for how farm animals should be fed and cared for. His arguments about why humans should care about these are based on spiritual convictions, referring to a cosmic reality where incarnation plays a big role. He stated that mankind is indebted to the animals since their sacrifices have made it possible for us to be incarnated as humans on earth. We therefore owe animals gratitude and respect, and this should be expressed through how farm animals are treated. Furthermore, humans and animals are spiritually related as per the philosophy of biodynamic farming.

Steiner saw animals as a very important part of the (“farm organism”), alongside the other parts like soil, plants and humans. He thus considered animals a natural part of every biodynamic farm. Steiner’s ideas regarding the importance of allowing the animals a natural behavior has led to husbandry practices close to those advocated by modern ethologists. He also advocated outdoor grazing for all livestock for spiritual reasons. Thus, even though the philosophical basis may be radically different, in practice biodynamic animal husbandry by large is similar to the organic animal husbandry prescribed by the IFOAM standards. Many of the early pioneers were also adherents of both Steiner and Howard (Conford 2001). There are some evident differences that have metaphysical explanations; for example, in biodynamic farming cows should not be dehorned.

Hans Muller, working in Switzerland and later in Germany, founded a movement for agricultural reform centered on Christian concepts of land stewardship and preservation of family farms. Soil fertility was maintained through crop rotation and careful management and use of animal manures. In UK, Stapledon’s work with alternate husbandry systems and Howard’s work on the role of organic matter in soils and composting provided a powerful stimulus to Lady Eve Balfour, who undertook the Haughly experiments (1939-1969) to investigate the links between the way food is produced, food quality and human health. Among the many pioneers of organic farming, Albert Howard (1873-1947) and Lady Eve Balfour (1898-1990) were some of the most influential in the English-speaking world (Conford 2001). Howard was an agricultural scientist, working in both India and England during the first half of the 20th century. He believed that there is a connection between a healthy soil and the health of plants, animals and humans, and that the key to a healthy soil is livestock manure and composting. This view was shared by many of the early critics of conventional farming (Conford 2001). Howard inspired Eve Balfour to start an experimental farm where his ideas about cropping could be tested in practice. She also published a book, *The Living Soil* (Balfour 1943), that spurred the founding of the Soil Association in 1946. The Soil Association of UK is now one of the leading organizations on organic agriculture recognized worldwide.

The publications like Rachel Carson’s book *Silent Spring* (1963) which focused on the use of pesticides and another book *Animal Machines* in 1964 by Ruth Harrison focused on livestock production, contributed to the new interest in alternative ways to practice agriculture that grew during the late 1960’s, mainly among young people and mainly out of an interest in environmental issues and a wish to create an alternative livelihood. These enthusiasts to some extent embraced the veterans of the early alternative movements (mostly biodynamic and organic-biological farmers), taking their knowledge and experience as departure points for developing new agricultural practices that were thought to be in harmony with the land. Thus, today’s organic farming grew out of the work of the early pioneers combined with the new and radical ideas flourishing over the years. The criticism of industrialized animal husbandry was an integral part of the early organic movement.

In USA, the Rodale family founded the Soil and Health Foundation in 1947, to study the production of healthy crops and livestock while maintaining healthy and fertile soils and to link the farm produce with human health and nutrition. The Japanese farmer and philosopher Masanobu Fukuoka practiced and promoted natural farming throughout the world and has followers in India too. His book *One-Straw Revolution* has been widely acclaimed. The formation of the International Federation of Organic Agriculture Movements (IFOAM) in 1972, gave an international framework for the discussion and codification of internationally recognized principles of organic farming. The IFOAM is now world leader as far as the developments in the area of organic farming are concerned. Organic agriculture is now being practiced in 160 countries and 37.2 million hectares of agricultural land are managed organically by 1.8 million farmers. It is on the rise in term of land, number of farms and farmers as also the production of certified organic agricultural products around the world.

Organic Farming: The Definition

Organic farming has a very strict definition: it denotes farming systems that adhere to the standards of organic farming. Organic agriculture has been defined and explained in many ways but all converge to state that it is a system that relies more on ecosystem management rather than dependent on external agricultural inputs. It is a system that begins to consider potential environmental and social impacts by eliminating the use of synthetic inputs, such as synthetic fertilizers and pesticides, veterinary drugs, genetically modified seeds and breeds, preservatives, additives and irradiation. These are replaced with site-specific management practices that maintain and increase long-term soil fertility and prevent pest and diseases (FAO 2005).

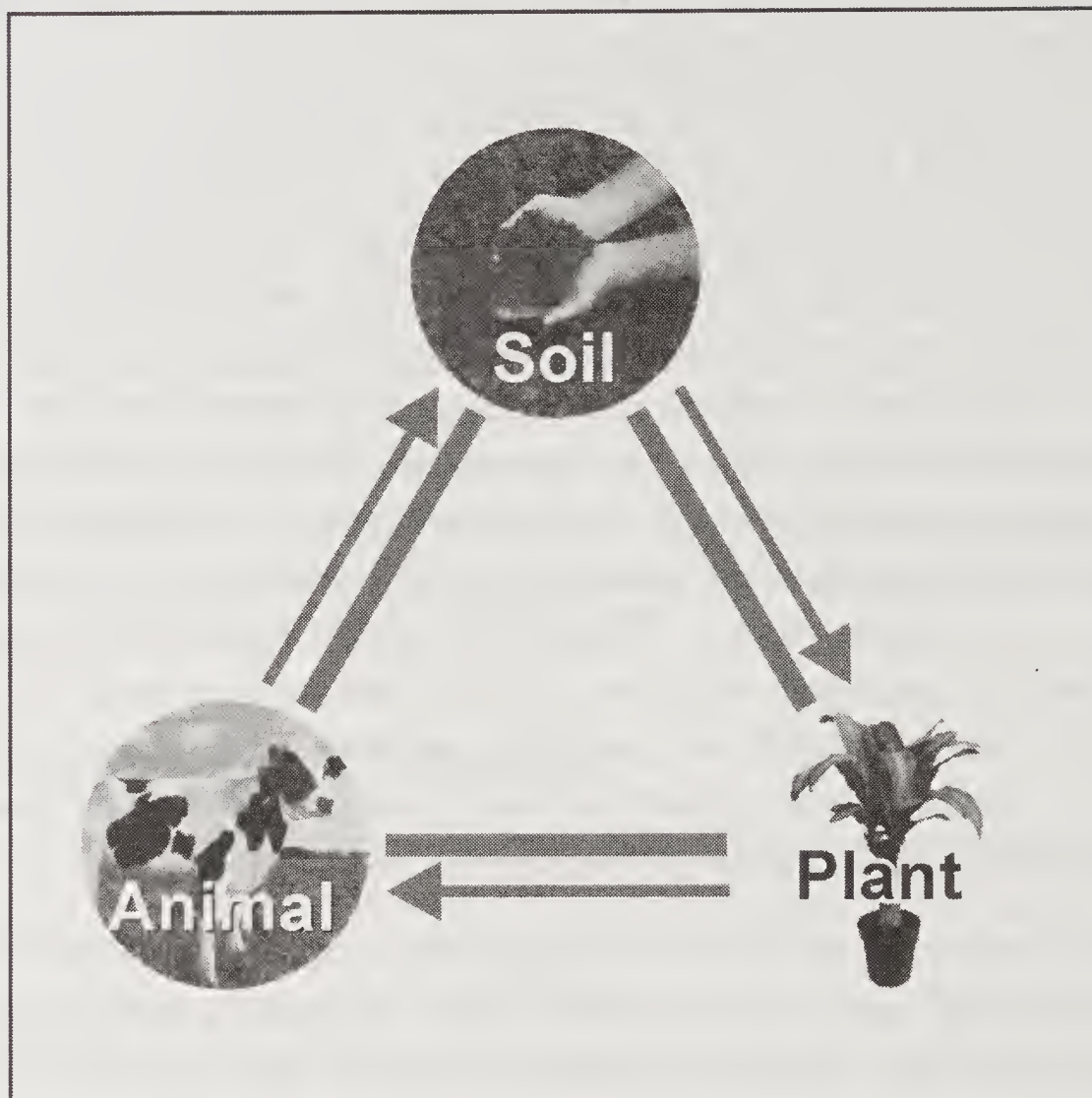
FAO/WHO Codex Alimentarius Commission defines organic farming as “a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems”. This is accomplished by using, where possible, agronomic, biological, and mechanical methods, as opposed to using synthetic materials, to fulfill any specific function within the system. The primary goal of organic agriculture is to optimize the health and productivity of interdependent communities of soil life, plants and people... [where] systems are based on specific and precise standards of production which aim at achieving optimal agro-ecosystems which are socially, ecologically and economically sustainable. This is accomplished by using, where possible, agronomic, biological, and mechanical methods, as opposed to using synthetic materials, to fulfill any specific function within the system.

According to Soil Association (UK), Organic farming is an agricultural system that encompasses: management practices which sustain soil health and fertility; the use of natural methods of pest, disease and weed control; high standards of animal welfare; low levels of environmental pollution; enhancement of the landscape, wildlife and wildlife habitat; and the prohibition of all genetically engineered food and products. Organic farming is an integrated system of farming based on ecological principles. It promotes biodiversity, biological cycles and soil biological activity. Organic farming uses environmentally friendly methods of crop and livestock production, without use of synthetic fertilizers, growth hormones, growth enhancing antibiotics, synthetic pesticides or gene manipulation. Organic agriculture is a way of agriculture production that adopts a series of sustainable agricultural technologies to achieve a well-sustained and stable agricultural production system, where, in accordance with certain standard of organic agricultural production, prohibits the use of genetically modified organisms (GMOs) and products derived there from and synthetic chemical fertilizers, pesticides, regulators and feedstuff additives in agriculture production with respect to natural rules and ecological theories and with coordinated balance between plant and animal production.

Organic farming can be defined as an approach to agriculture where the aim is to create integrated, humane, environmentally and economically sustainable agricultural production systems producing acceptable levels of crop, livestock and human nutrition, protection from pests and diseases, and an appropriate return to the human and other resources employed. Maximum reliance is placed on locally or farm-derived, renewable resources and the management of self-regulating ecological and biological processes and interactions. Reliance on external inputs, whether chemical or organic, is reduced as far as possible. In many European countries, organic agriculture is known as ecological agriculture, reflecting this reliance on ecosystem management rather than external inputs.

After following an elaborate and democratic procedure, the World Board of IFOAM approved the definition of organic agriculture in March 2008, which says: Organic agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved. Organic farming methods combine scientific knowledge of ecology and modern technology with traditional farming practices based on naturally occurring biological processes.

Aims of Organic Farming



Organic production and processing is based on a number of principles and ideas (IFOAM 2006). All are equally important, thus, this list does not seek to establish any priority of importance. These principles include:

- To produce sufficient quantities of high quality food, fiber and other products.
- To work compatibly with natural cycles and living systems through the soil, plants and animals in the entire production system.
- To recognize the wider social and ecological impact of and within the organic production and processing system.
- To maintain and increase long-term fertility and biological activity of soils using locally adapted cultural, biological and mechanical methods as opposed to reliance on inputs.
- To maintain and encourage agricultural and natural biodiversity on the farm and surrounds through the use of sustainable production systems and the protection of plant and wildlife habitats.
- To maintain and conserve genetic diversity through attention to on-farm management of genetic resources.

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- To promote the responsible use and conservation of water and all life therein.
- To use, as far as possible, renewable resources in production and processing systems and avoid pollution and waste.
- To foster local and regional production and distribution.
- To create a harmonious balance between crop production and animal husbandry.
- To provide living conditions that allows animals to express the basic aspects of their innate behavior.
- To utilize biodegradable, recyclable and recycled packaging materials.
- To provide everyone involved in organic farming and processing with a quality of life that satisfies their basic needs, within a safe, secure and healthy working environment.
- To support the establishment of an entire production, processing and distribution chain which is both socially just and ecologically responsible.
- To recognize the importance of, and protect and learn from, indigenous knowledge and traditional farming systems.

Here are some of organic farming's main features:

- Organic farming severely restricts the use of artificial chemical fertilizers and pesticides.
- Instead, organic farmers rely on developing a healthy, fertile soil and growing a mixture of crops.
- Animals are reared without the routine use of drugs, antibiotics and dewormers common in intensive livestock farming.

Positive Effects of Organic Farming

- It helps in maintaining environmental health by reducing the level of pollution.
- It reduces human and animal health hazards by reducing the level of dangerous chemical residue in the product.
- It helps in keeping agricultural production at a sustainable level.
- It reduces the cost of agricultural production and also improves the soil health.
- It ensures optimum utilization of natural resources for long-term benefit and helps in conserving them for future generations.
- It not only saves energy for both animal and machine, but also reduces risk of crop failure.

Organic products are grown under a system of agriculture without the use of chemical fertilizers and pesticides with an environmentally and socially responsible approach. This is a method of farming that works at grassroots level preserving the reproductive and regenerative capacity of the soil, good plant nutrition, and sound soil management, produces nutritious food rich in vitality which has resistance to diseases. It is largely believed that plant products from organic farming are substantially better in quality like, look, flavour, and aroma and animal products to be of better quality when they are fed with feed and fodder produced organically. The underground water of the area where such farming system is in practice has been found to be free of toxic chemicals.

According to IFOAM, organic agriculture contributes to food security by a combination of many features, most notably by:

- * Increasing yields in low-potential areas (e.g. dry lands) and market marginalized areas
- * Conserving bio-diversity and nature resources on the farm and in the surrounding environment
- * Increasing income and/or reducing production costs
- * Producing safe and diversified food
- * Creating sustainable food supply chains
- * Being environmentally, socially and economically sustainable in the long term

The beliefs such as better taste, improved quality and higher nutritive value generally attached with organically produced foods is a matter of intensive research, thus, has been argued and not conclusively proven yet. Nevertheless, market for organically produced foods is on the increase, with 10-20% yearly increase in sales of organically grown food stuffs which are sold with significant price premiums. Thus, it's a good opportunity for developing countries like India to pay attention to this growing business of organic foods.

Organic Farming: A Matter of Standards

To layman, traditional agriculture where chemicals are not used to enhance production is organic farming, but technically speaking, organic farming is much more than non- use of chemicals. Simply, chemicals are not used does not qualify it to be called organic. In that sense, Indian traditional system of agricultural production that was in vogue during pre-green revolution days prior to 1960's, ideally do not qualify to be called organic agriculture *per se* though very close in characteristics to organic farming systems. There are obvious differences in traditional agricultural systems and organic agricultural production systems, foremost being the adherence

to the well defined standards of organic production. Nevertheless, a good understanding of traditional and modern intensive production practices help in doing well in organic production systems.

Organic production systems, unlike traditional or conventional systems of production, are governed by a set of standards to be followed strictly by the producers of organic food. Compliance with these standards is verified by certification agencies authorized by the respective governments. A farm may be classified as organic, if it meets the criteria stipulated in a set of guidelines known as organic standards. The quality of production under organic management is ensured through certification procedures using internationally acceptable standards for organic production. Organic certification guarantees not only the quality of the product but also the quality of production. It means, it is also important in what ways the production was taken up. In case of conventional products, there is no way to guarantee the production procedure, but, in organic farming, production procedure is certified to be safe as well as environment friendly. Plant and animal products intended for human consumption and animal feeding that are produced, processed and handled in accordance with this Standard are labeled as organic products. Organic agriculture is considered to be consumer or market-driven since products are clearly identified through certification and labeling. Consumers take a conscious decision on how their food is produced, processed, handled and marketed. The standards as well as the consumer, both, have a strong influence over organic production.

Organic farming can be practiced by any farmer following its principles and guidelines in order to consume organic foods at household levels, but from the marketing or trade standpoint, it requires certification by accredited agencies. The steps involved in certification are: registration of the producers and processing industries, provision of basic information on the crop and farm, inspection and verification of the field and processing unit, inspection of production methods and practices by the inspector of the certifying agency. A transition period of 1–3 years is required during which no inorganic fertilizer and agrochemicals are used on the farm before which the produce can be marketed. Since crop yields during this transitory period are low, farmers intending to go for organic farming would suffer losses, unless some compensation is made for this. The cost of these products is further increased by the fact that the production in organic farming is generally 20–38% less compared to that using modern agricultural practices at least in initial years. Furthermore, the current standard of organic farming is quite stringent in respect of organic manure used, animal feed/fodder used, minerals or soil amendments used, quality of surface irrigation and underground water and agricultural practices adopted at farms in the neighbourhood. Production of organic food, therefore, requires considerable attention, care and skills and above all a good link with its market. In the production and marketing of the organically produced agricultural products, apart from the product quality standards, check is on the process of its production, which is ensured by compliance to the standards set for the purpose.

Finally, ‘Organic’ in organic agriculture is a labeling term that denotes products that have been produced in accordance with certain standards during food production, handling, processing and marketing stages, and certified by a duly constituted certification body or authority. The organic label is, therefore, a process claim rather than a product claim. It should not necessarily be interpreted to mean that the foods produced are healthier, safer or all natural. It simply means that the products follow the defined standard of production and handling, although surveys indicate that consumers consider the organic label as an indication of purity and careful handling. Organic standard will not exempt producers and processors from compliance with general regularity requirements such as food safety regulations, pesticide registrations, general food and nutrition labeling rules, etc. (FAO 2000). The basic principles and standards for organic farming are formulated by the International Federation of Organic Agriculture Movements (IFOAM), which is an umbrella organization covering groups in more than 115 countries.

The organic standards have the dual function of providing guaranties to consumers that production rules have been adhered to as well as giving guidance and advice to the producers on how organic principles are to be applied on the farm, with the certification bodies acting as intermediaries between these two interest groups. Standards also act as the basis for the contract between producer and certification body, which is binding on both parties.

Principles of Organic Agriculture

The Principles of Organic Agriculture were established by the International Federation of Organic Agriculture Movements (IFOAM) in September, 2005. They embody a global vision for organic farming. The General Assembly of IFOAM approved the Principles of Organic Agriculture on September 28, 2005. The principles were developed during an intensive two-year participatory process. The aim of the principles is both, to inspire the organic movement and to describe the purpose of organic agriculture to the wider world. These Principles of Organic Agriculture explain the concept, role and ways the organic agriculture can sustain the life in this planet in a sustainable manner. These are considered to be the roots from which organic agriculture grows and develops. They express the contribution that organic agriculture can make to the world and a vision to improve all agriculture in a global context. Agriculture is one of humankind’s most basic activities because all people need to nourish themselves daily. History, culture and community values are embedded in agriculture. The Principles apply to agriculture in the broadest sense, including the way people tend soils, water, plants and animals in order to produce, prepare and distribute food and other goods. They concern the way people interact with living landscapes, relate to one another and shape the legacy of the future generations. These principles are propagated by the IFOAM globally in anticipation that these principles would be adopted world-wide. The four principles of organic agriculture are as follows:

- **The Principle of Health** - Organic agriculture should sustain and enhance the health of soil, plant, animal and human as one and indivisible. The principle of health points out that the health of individuals and communities cannot be separated from the health of ecosystems - healthy soils produce healthy crops that foster the health of animals and people. Health is the wholeness and integrity of living systems. It is not simply the absence of illness, but the maintenance of physical, mental, social and ecological well-being. Immunity, resilience and regeneration are key characteristics of health. The role of organic agriculture, whether in farming, processing, distribution, or consumption, is to sustain and enhance the health of ecosystems and organisms from the smallest in the soil to human beings. In particular, organic agriculture is intended to produce high quality, nutritious food that contributes to preventive health care and well-being. In view of this it should avoid the use of fertilizers, pesticides, animal drugs and food additives that may have adverse health effects.
- **The Principle of Ecology** - Organic agriculture should be based on living ecological systems and cycles, work with them, emulate them and help sustain them. This principle roots organic agriculture within living ecological systems. It states that production is to be based on ecological processes, and recycling. Nourishment and well-being are achieved through the ecology of the specific production environment. For example, in the case of crops this is the living soil; for animals it is the farm ecosystem; for fish and marine organisms, the aquatic environment.

Organic farming, pastoral and wild harvest systems should fit the cycles and ecological balances in nature. These cycles are universal but their operation is site-specific. Organic management must be adapted to local conditions, ecology, culture and scale. Inputs should be reduced by reuse, recycling and efficient management of materials and energy in order to maintain and improve environmental quality and conserve resources.

Organic agriculture should attain ecological balance through the design of farming systems, establishment of habitats and maintenance of genetic and agricultural diversity. Those who produce, process, trade, or consume organic products should protect and benefit the common environment including landscapes, climate, habitats, biodiversity, air and water.

- **The Principle of Fairness** - Organic agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities. Fairness is characterized by equity, respect, justice and stewardship of the shared world, both among people and in their relations to other living beings. This principle emphasizes that those involved in organic agriculture should conduct human relationships in a manner that ensures

fairness at all levels and to all parties - farmers, workers, processors, distributors, traders and consumers. Organic agriculture should provide everyone involved with a good quality of life, and contribute to food sovereignty and reduction of poverty. It aims to produce a sufficient supply of good quality food and other products. This principle insists that animals should be provided with the conditions and opportunities of life that accord with their physiology, natural behavior and well-being. Natural and environmental resources that are used for production and consumption should be managed in a way that is socially and ecologically just and should be held in trust for future generations. Fairness requires systems of production, distribution and trade that are open and equitable and account for real environmental and social costs.

- **The Principle of Care** - Organic agriculture should be managed in a precautionary and responsible manner to protect the health and well being of current and future generations and the environment. Organic agriculture is a living and dynamic system that responds to internal and external demands and conditions. Practitioners of organic agriculture can enhance efficiency and increase productivity, but this should not be at the risk of jeopardizing health and well-being. Consequently, new technologies need to be assessed and existing methods reviewed. Given the incomplete understanding of ecosystems and agriculture, care must be taken. This principle states that precaution and responsibility are the key concerns in management, development and technology choices in organic agriculture. Science is necessary to ensure that organic agriculture is healthy, safe and ecologically sound. However, scientific knowledge alone is not sufficient. Practical experience, accumulated wisdom and traditional and indigenous knowledge offer valid solutions, tested by time. Organic agriculture should prevent significant risks by adopting appropriate technologies and rejecting unpredictable ones, such as genetic engineering. Decisions should reflect the values and needs of all who might be affected, through transparent and participatory processes.

To meet above principles, farmers interested to adopt organic agriculture need to implement a series of practices that optimize nutrient and energy flows and minimize risk, such as crop rotations and enhanced crop diversity, different combinations of livestock and plants, symbiotic nitrogen fixation with legumes, application of organic manure and biological pest control. All these strategies seek to make the best use of local resources towards sustainability, diversity, renewability and integrity which are important aspects of organic farming. Hence, organic systems are inherently adapted to site-specific endowments and limitations.

Organic Agriculture: Where it is Heading for?

Organic agriculture is a production system striving to work in line with natural ecosystems. It emphasizes local adaptation to climate and natural resources; it uses cover crops, crop rotations, intercropping and diversity instead of chemicals. New environmentally friendly production techniques, like biological pest control and thermal weeding, are used as a complement. Organic agriculture is being increasingly practiced all over the world, both in industrialized and developing countries, in commercial production and in subsistence farming, as well as in large and small scale production. The market for organic products is increasing by about 10-15 percent per year and the global sales of organic food and drink reached 54.9 billion US \$ in 2009 (IFOAM 2011). The organic land in India is 1.2 million hectares (ranks 7th in the world) constituting 0.6% of total agricultural land and with 677257 number of producers (Willer and Kilcher 2011). India exported 86 organic products worth US\$ 100.40 million during 2007-08 with 30% growth over previous years (APEDA 2009). The export figures further rose to US\$122 million in 2009-10 (Gunner 2011) (Fig.1). India has the largest number of certified organic farms (> 600000) yet in terms of land area the farms are small, though 3.36 million hectares of forest land is also certified for wild production in India. In many low-income countries, organic agriculture is developing rapidly both for export and for local consumption. Organic agriculture is increasingly seen as a major component in sustainable rural development, and has proven to be relevant for food security. Environmental awareness amongst consumers, producers and policy makers, is rapidly increasing and agriculture of the future will not only have to be sustainable but also provide food of high quality at affordable prices to growing populations. Organic agriculture tries to achieve this.

Fig 1: Growing export of certified organic agricultural products from India.



We must understand, it is not the food alone which can be taken into isolation to decide what to produce and how to produce? Associated issues linked with food production like fuel, finance, climate, biodiversity and poverty exigencies too are important to decide production systems to be pursued. For, example, the so called modern chemical based intensive food production system, once considered ideal is now seen as a principal agent of ecosystem destruction, soil degradation, environmental pollution, species' extinction, water contamination and greenhouse gas emissions. Recognizing this, the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) has conveyed a clear message that "the way the world grows its food will have to change radically to better serve the poor and hungry if the world is to cope with a growing population and climate change while avoiding social breakdown and environmental collapse". We need to do business on planet Earth differently, and to adopt a more sophisticated approach— one that rewards a more creative and intelligent management of natural resources reflecting the realities and knowledge of the 21st century (UNEP-UNCTAD 2010). Organic agriculture is increasingly being considered as one of the more promising options for implementing such an approach. It provides opportunities for environmental protection, trade promotion, and it has also shown to have a positive effect on reducing greenhouse gas emissions, improving soil fertility and biodiversity, and contributing to water conservation. The UN agencies have found that organic agriculture is well suited to small-scale farming and can increase the yields and incomes of subsistence farmers in developing countries, thereby contributing to poverty reduction and sustainable rural development.

Developing countries like India have a certain comparative advantage in organic agriculture, as they possess relatively abundant labour and use relatively fewer agrochemicals in production. Thus, the United Nations agencies like FAO, UNDP, UNCTAD, UNEP, and many other international organizations like IFAD and NGOs have approved organic farming as a system of production deserving sincere attention by all the countries especially the developing ones. Moreover, organic agriculture offers significant potential export opportunities for developing countries. By eschewing the use of synthetic fertilizers and pesticides, organic agriculture has proven to be 20 to 56 per cent more efficient in terms of energy use and 64 per cent more efficient in terms of CO₂ emissions than the chemical-intensive industrial farming model. Organic farms have also been shown to sequester three to eight more tonnes of carbon per hectare than conventional farms (UNEP-UNCTAD 2010). Organic agriculture is increasingly being considered as one of the more promising options for implementing such an approach. It provides opportunities for environmental protection, trade promotion, and it has also shown to have a positive effect on reducing greenhouse gas emissions, improving soil fertility and biodiversity, and contributing to water conservation. The UN agencies have found that organic agriculture is well suited to small-scale farming and can increase the yields and incomes of subsistence farmers in developing countries, thereby contributing to poverty reduction and sustainable rural development.

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In developing countries, organic agricultural systems achieve equal or even higher yields, as compared to the current conventional practices, which translate into a potentially important option for food security and sustainable livelihoods for the rural poor in times of climate change. Certified organic products cater for higher income options for farmers and, therefore, can serve as promoters for climate-friendly farming practices worldwide (Scialabba and Müller-Lindenlauf 2010). Organic agriculture has achieved the distinction of being most innovative form of agriculture; those who adopt it are not the laggards but the innovators leading to its rapid diffusion across the globe. It is pertinent here to quote:

“Today looking back to my 1954 Iowa diffusion investigation, the organic farmer that I interviewed certainly has had the last laugh over agricultural experts. My research procedures classified him as a laggard in 1954; by present standards he was a super innovator of organic farming. So for two different (and opposing) innovations, this farmer was in two extremely different adopter categories.”

-Rogers (1995) quoted in his book ‘Diffusion of Innovations’

3

Organic Livestock Farming

“The greatness of a nation and its moral progress can be judged by the way its animals are treated”

-Mahatma Gandhi

Taking note of the definition, concept and principles of organic agriculture as discussed in previous chapter, organic animal husbandry or organic livestock farming may be defined as a system of livestock production that promotes the use of organic and biodegradable inputs from the ecosystem in terms of animal nutrition, animal's health, animal housing and breeding. It deliberately avoids use of synthetic inputs such as drugs, feed additives and genetically engineered breeding inputs, while ensuring the welfare of animals. Organic farming is based on closed agricultural systems and minimal use of non-renewable energy sources (e.g. artificial fertilizers). Livestock, particularly ruminants, play an important role in maintaining the fertility of crop and grasslands. The basic principles of organic livestock production can be summarized as-

“Organic Livestock Farming is... an Ecological Production Management System and it's a life style, which aims at broader sustainability of life and resources on the planet”.

- Land-based activity (homegrown feed; manure returned to the same land that produces the feed)
- Good animal health and welfare (outdoor, free-range, maximum access to pasture etc.)
- Optimization rather than maximization of production (breeding for traits other than yield or growth rate, feeding species-specific diets etc.)
- Lower stocking densities and production levels than that in conventional systems.

Key Considerations in Organic Livestock Production

The major challenge in organic livestock production systems is to honour the organic principles in a wide range of diverse systems under a wide range of circumstances and conditions including systems which are not yet certified ‘organic’ at the moment. It’s recommended that developing organic animal husbandry at all times require a thorough analysis of the problems, opportunities and existing local knowledge (Vaarst *et al.* 2006). Some key considerations in organic animal husbandry that producers and other stakeholders need to take into account are listed here under:

Origin of Livestock: Livestock and products from the livestock that are sold, labeled, or advertised as organic must be from livestock that originate from animals that were managed under continuous organic management from the last third of gestation or at hatching.

Livestock Feed: Livestock that are produced under organic management must have their total ration that comprised agricultural products including pasture, forage, and crops that are organically produced and handled organically. There are certain non-synthetic and synthetic substances that can be used as feed additives and supplements. Dairy cattle under 9 months of age are allowed 20% of their feed coming from non-organic sources. Plastic pellets, urea, manure, mammalian or poultry slaughter by-products are not allowed.

Living Conditions: An organic livestock producer must create and maintain living conditions that accommodate natural behavior and health of the animal. The living conditions must include access to outdoors, shade, shelter, fresh air, direct sunlight suitable to the species, and access to pasture for ruminants.

Waste Management: Organic livestock producers are required to manage manure so that it does not contribute to the contamination of crops, soil, or water and optimizes recycling of nutrients.

Health Care: Organic livestock production practices require the producer to establish preventative health care practices. The health care practices include selecting the appropriate species and type of livestock, providing adequate feed, create an appropriate environment that minimizes stress, disease, and parasites, administration of vaccines and veterinary biologics, animal husbandry practices to promote animal wellbeing in a manner that minimizes pain and stress. Producers can not provide preventative antibiotics. Producers are encouraged to treat animals with appropriate treatment, including antibiotics and other conventional medicines when needed but treated animals can not be sold or labeled as organic. Producers can not administer hormones or other drugs for growth promotion.

Record Keeping/Audit Trail: Organic livestock operations need to maintain records for a number of reasons. Certainly, records are important for financial management of the organic livestock enterprise. Likewise, records are important for the

verification of organic status of animals, production, harvesting, and handling practices associated with the organic products and animals. Records are required to be maintained for 5 years, and must demonstrate compliance with the organic food production standards and acts, if any in place.

Almost all countries who are investing in developing their organic agriculture sector are taking note of developments taking place in developed countries, and making necessary changes in the production standards so as to enable them to exports to the major consuming countries in the North. The developing countries in Asia like China, India, Thailand, Malaysia, Sri Lanka, in Africa like Kenya, Tanzania, Ethiopia and among South American countries Argentina and Brazil have already developed regulations, standards and certification procedures including for organic livestock production. The number of such countries is increasing mainly looking at improved exports prospects as also slowly growing domestic market for environmentally friendly food products (Willer and Kilcher 2011).

The basic standards (IFOAM 2005) developed by the IFOAM state that one of the basic principles of organic agriculture is “to give all livestock conditions of life with due consideration for the basic aspects of their innate behaviour”. Animals have highly developed central nervous systems and behavioural needs, which place an added responsibility on the livestock producer. The production system is not sustainable, if animals show evidence of pain, disease, or distress as a result of an inadequate system or disharmony between the animals and the system. The need to prevent such situations forms the basis for the concepts of “positive health” and “positive welfare”, as introduced in the EU regulation 1804/99, incorporated in EU regulation 2092/91 on organic production (Vaarst *et al.* 2005). The step further is not only to prevent any pain, discomfort, or disease, but also to promote health and well being in each animal as well as on herd level and population level. This is a quality of animal products referring to mode of production, the so called process quality. The philosophy of organic farming emphasizes the need to produce food in an “integrated, humane, environmentally and economically sustainable agricultural production system”. Organic products have characteristics, which distinguish them from conventional farm produces, viz. Integrated animal and crop production, safer products devoid of any chemical residues like pesticides, antibiotics, etc., more nutritious and natural products, higher quality, environment friendly and highest regard for human and animal welfare.

Under organic livestock production systems, it is expected that organic meat, poultry and egg products come from farms that have been inspected to verify that they meet rigorous standards which mandate the use of organic feed, prohibit the use of antibiotics, give animals access to outdoor, fresh air and sunlight. The production methods are selected based on criteria that meet all health regulations, work in harmony with the environment, build biological diversity and foster healthy soil and growing conditions. After the production, animals are marketed that were

raised without use of toxic persistent pesticides, antibiotics and paraciticides (Borell and Sorensen 2004). Animal health, well being, better living conditions, welfare measures, feeding practices are to be ensured through a set of standards and maintenance of written records by the organic livestock farmers. Better managemental practices and prevention are emphasized over treatment. Thus, the primary characteristics of organic livestock production system are: a defined standard; greater attention to animal welfare; no routine use of growth promoters, animal offal or any other additives; at least 80% of feed grown according to organic standards, without the use of artificial fertilizers or pesticides on the crops or grass. To be precise, organic meat, milk and eggs means that are produced, harvested, preserved and processed as per organic standards.

Livestock plays an important role in relation to the general principles of organic agriculture, supporting biological cycles within the farming system and diversifying production (Hermansen 2003). To be successful, organic agriculture must integrate plant and livestock production to the extent possible to optimize nutrient use and recycling. Consumers buy meat and milk products to experience direct qualities, such as taste, nutritive value, and food safety, but also to benefit from indirect qualities, which are linked to the production process. They expect animals to be treated with compassion and to a high level regarding their welfare, and that production has been carried out in an environmentally friendly manner (Sorensen and Jakobsen 2005).

The concept of organic livestock production gained momentum recently in developed countries because of concerns for animal welfare, chemical residues, incidence of bovine spongiform encephalopathy (BSE), foot and mouth disease (FMD), bird flu, swine flu, genetically modified food (GMF) and some bacterial diseases. The affluent sections in developing countries too are influenced by these concerns and this stratum of society may increasingly look for organic livestock products fuelling the demand of organic food products in developing countries too. Moreover, the organic farming is considered to be more sustainable than the input intensive conventional systems of crop and livestock production. Therefore, whether one likes it or not, organic farming is rapidly expanding world over. There may be critics especially in developing countries where chronic food shortages are still common but organic is a growing reality, it's happening everywhere with the support of Non-Governmental Organizations (NGOs), private sector and also the government agencies. The Food and Agriculture Organization (FAO) of United Nations too is helping the growth of organic farming by assisting the developing countries through its programmes. It indicates the acceptance of organic farming as a credible system worth paying attention.

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In order to achieve the animal welfare, environmental protection, resource-use sustainability and other objectives, certain key principles are adhered to under organic livestock production systems, which include:

- management of livestock as land-based systems (i.e. excluding feedlots and intensively-housed pig and poultry units) so that stock numbers are related to the carrying capacity of the land and not inflated by reliance on 'purchased' hectares from outside the farm system, thus, avoiding the potential for nutrient concentration, excess manure production and pollution. As such, landless animal husbandry prevalent in India is not ideally suitable for organic livestock farming; unless, the landless livestock keepers go for land leasing.
- reliance on on-farm- or locally-derived renewable resources, such as biologically-fixed atmospheric nitrogen and home-grown livestock feeds, thereby reducing the need for non-renewable resources as direct inputs or for transport;
- reliance on feed sources produced organically, which are suited to the animal's evolutionary adaptations (including restrictions on use of animal proteins) and which minimize competition for food suitable for human consumption;
- maintenance of health through preventive management and good husbandry in preference to preventive treatment, thereby reducing the potential for the development of resistance to therapeutic medicines as well as contamination of workers, food products and the environment;
- use of housing systems which allow natural behaviour patterns to be followed and which give high priority to animal welfare considerations, with the emphasis on free-range systems for poultry;
- use of breeds and rearing systems suited to the production systems employed, in terms of disease resistance, productivity, hardiness, and suitability for ranging.

According to Sundrum (2001), organic farming is not a production method to solve all problems in livestock production. It is primarily a production method for a specific premium market with high requirements for the quality of the production process, demanding high management qualification. For the development of organic livestock farming, it is important to ensure the confidence of the consumers in organic products by realizing the self created demands to a high degree. Therefore, organic farming is a challenge not only for the farmer but also for agricultural research and interdisciplinary work. The countries that have accepted this challenge have progressed even in developing country circumstances. The Latin American countries, like Argentina, Brazil and Uruguay produce substantial amounts of organic meat (ITC 1999). In Argentina, more than one million hectares of land is

dedicated to organic livestock production, the majority of which produce organic beef cattle and 80% of the produce is exported to Europe. In Brazil too, organic beef, poultry, egg and milk production is increasing (USDA 2001). The organic dairy and meat products are now increasingly available in markets in EU, USA, New Zealand, Australia, Japan, Argentina, Brazil and some other countries. This trend on livestock products may further expand in other Asian and African countries where organic agro products have already entered into market. For instance, organic spices, pulses, rice etc are now available in market in Indian metros and several other Asian countries.

Farm animals are an important and integrated part of agricultural production systems especially in India, where subsistence agriculture is largely in practice and specialized commercial farming is yet not very popular. In case of organic farms, animals are considered an important contributor, thus, almost an essential component of the organic farms. They make valuable contributions to the productivity and sustainability of organic agricultural systems. In addition to this strong economic bond between humans and animals in organic farming, there also is a moral (and sometimes emotional) bond to animals as sentient and fellow beings on this planet. This imposes a responsibility on humans for the welfare of farm animals. However, the development of organic animal husbandry has been slower than the organic plant production. There are several reasons for this, historical and philosophical as well as the fact that research on animal production often is more expensive and difficult to carry out compared to crop research. However, organic animal research has increased considerably in several European countries lately and resulting from this, improved efficiency and productivity can be expected in organic animal production, as well as better animal welfare.

Most of the Indian farmers invariably maintain some livestock species, bovines, caprines, backyard poultry, pigs, and draught animals, mostly to meet household requirements of milk, meat or simply farmyard manure for crop fields and fuel for cooking. These animals are largely maintained on crop residues, on-farm produced feed and fodder and with little health care expenses, so making the system of production closer to the organic production methods. With an eye on the requirements of organic livestock production as well as the growing market for organic food products, the farmers can easily be oriented towards organic livestock farming.

To remain relevant to the global economy, the developing countries too have to produce what the consumers are demanding globally. Therefore, it's a necessity to focus attention on this system of production. India certainly needs to move forward with its organic farming activities, if not in big way, certainly small steps are essentially needed. This is what is rightly happening in India currently in case of high value commercial crops. The similar efforts are also needed in the area of organic animal husbandry through systematic efforts made in a network mode

drawing expertise from the different quarters. There is strong possibility that India will be able to produce organic livestock products for not only its domestic consumers but also the consumers elsewhere in the world, given the vast pool of resources including the technical and scientific manpower India has. Some South East Asian countries especially Malaysia and Thailand have already initiated research and development work in the area of organic animal husbandry, which deserve appreciation, and in fact may guide and show the path to other developing countries in the region.

Opportunities for Tropical Countries

There are strong reasons for tropical countries to focus attention on organic livestock production. Some of the encouraging factors are: (i) Demand for organic livestock products is growing in the USA, EU, Japan, Australia, Argentina and Brazil, (ii) Belgium, Luxembourg, Netherlands and UK import significant proportions of organic produce, (iii) The EU is a net importer of organic beef, sheep and goat meat, (iv) Consumers pay a large price premium for organic food in Austria, Belgium, Germany and UK, (v) Some developing countries do trade livestock products to developed countries, (vi) In 2001, 16% of broiler meat and 40% of beef imported to the UK came from developing countries, like Argentina and Brazil that export organic livestock products to EU (Harris *et al.* 2003) (vii) India, Nepal as also some African nations currently exporting certified organic honey, sourced mostly from forests and small scale producers. Organic honey is good entry point along with small ruminants to focus, for organic livestock production in these countries, (viii) To begin with, non-food livestock products, viz. organic textile/garments including the materials of animal origin like hides, leather, and wool offer hope for organic livestock production in tropical countries. There is a large import of textile raw materials and processed textiles into the UK; a significant proportion comes from developing countries. Current global market trends show a rapid increase in international trade in organic textiles. Therefore, organic leather has potential to be a valuable export commodity, (ix) Indigenous Technical Knowledge (ITK) available in poorer and developing countries may provide effective substitute to veterinary care, (x) The use of agro-chemicals is almost nil in major parts of India and Nepal for instance, ideal for the development of organic livestock production, (xi) The native livestock breeds which are prominent in tropical countries are less susceptible to diseases and stress, need for allopathic medicines/antibiotics is very less, (xii) Grass based extensive production systems/ forest based animal production prevalent in some parts of these countries have potential for conversion into organic animal husbandry, (xiii) Literacy is on the rise, media is making the consumers aware and concerned about animal welfare issues and health foods- it may boost domestic consumption of organic foods, (xiv) Growing domestic market for organic products in developing countries may help boost organic market at country, and regional level.

An overview of the situation reveals that Organic livestock production *per se* is yet to come up in most of the developing world except Latin American countries. For instance, Argentina exports large quantity of beef, while having a strong domestic market too for organic meat. Besides, Uruguay and Brazil are also significant producers of organic meat; Brazilian companies are even buying processing plants in Argentina to expand their influence. Mexico and Nicaragua have projects for producing organic meat, mainly for the national market. One big constraint keeping organic meat production in Latin America from moving forward is that the main consumers (in Europe and the US) ask only for the best pieces (i.e. the sirloin tenderloin and pistol cuts from the hindquarter). The rest of the meat has to be sold on the national market, mostly as conventional (Willer and Kilcher 2011). The developing countries in Asia and Africa may draw lessons from these Latin American countries in coming years. Organic aquaculture (shrimp and fish), is emerging in China, Indonesia, Vietnam, Thailand, Malaysia and Myanmar for export and domestic market (Willer and Kilcher 2011). This signals positively for the future growth of organic animal products.

Objectives of Organic Animal Husbandry

- To raise animals in a system that takes into consideration the wider issues of environmental pollution, greenhouse gas emissions, global warming, human health on consumption of animal products, allowing them to meet their basic behavioral needs and reduce stress.
- Diversify in keeping as many types of livestock on the holding as each furnishes different nutrients at the household level. For example, special attention should be given to small animals like goats, rabbits and poultry as income generated from this enterprise goes directly to the disadvantaged segments of the population, e.g. women and children. The nitrogen rich manure from small animals can be used to increase vegetable production in the kitchen gardens, thus, improving the family diet. Others like mules and donkeys are useful in transport, thus, reducing the consumption of non-renewable sources of energy, e.g. petroleum based fossil fuels.
- Exploit the natural behavior of animals in their production systems to reduce stress, e.g. chicken like perching at night and perching rails should be provided for this purpose. They should also be raised in deep litter system that allows them to scratch for ants and worms and dust bathe. Dark secluded nest should be provided as they like laying in dark secluded places. Pigs have rooting tendency, so they need to be provided wet muddy open spaces to perform rooting behaviour which is natural for pigs. Goats being browsers in nature like having their forage suspended high enough so that they can attain an upright posture etc. Already, in Indian traditional system, this need of goats is well taken care of by keeping lopped fodder at some heights.

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- Use of low external input which lessens the cost of production and allow for a sustainable system of production since most materials can be recycled in the farm and also locally available.
- Organic principles view livestock systems as part of a whole, including the process through which feed is supplied. The objective of organic livestock management is to create a nearly closed nutrient cycle whereby feed is supplied on-farm.
- Bridging of nutrients gap in soil, crops and animals, i.e. animals feed on crops and by-products of cultivated crops. The animals' waste in the form of farmyard manure is composted and taken back to the soil to replenish the lost soil nutrients through cultivation. This ensures the completion of nutrient cycle in the ecosystem.

Role of Animals

- They provide food to human in forms of meat, milk and honey.
- They utilize lands that are not suitable for cultivation to produce high value food products of animal origin, e.g. arid and semiarid areas, rocky and hilly topographies. Ruminants are able to convert waste crop by-products in high value human food.
- They can be used to generate income when their surplus products are sold for cash. They also play the role of insurance in families where they are sold in case of emergencies like sickness and other eventualities that require immediate funds that may not have been planned for.
- They play a social cultural role in terms of wealth expression, prestige, gifts and other social obligations like worship.
- They provide energy through draft power and domestic fuel, e.g. dry cow dung and biogas.
- They play an essential role in closing the carbon and nitrogen cycle in the ecosystems by providing manure used for fertilizing the soil. The ash obtained by burning dung is incorporated in compost manure to provide nutrient for crops.

Organic Vs Conventional Livestock Production: How These Differ?

Organic farming differs from conventional farming/intensive farming in many ways:

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- Organic livestock farming is more ethical and welfare concerned and is strongly related to the environment in which it operates, whereas conventional livestock farming is production oriented.
- Organic farming is primarily knowledge intensive, whereas conventional farming is more chemical and capital intensive. An organic farmer is expected to know the standards and guidelines of organic farming.
- Organic production involves less intensive livestock farming practices than in conventional ones. Synthetic fertilizers and pesticide sprays are prohibited in animal feed and fodder production and animals are kept at lower stocking rates, which in turn decrease the pollution risk. Grazing or access to outdoor for certain period of time in a day is required in organic livestock production.
- In contrast to conventional agriculture, the organic farm is considered as a farm organism, where the integrative and holistic aspects are given preference. Organic agriculture has clear benefits in reducing environmental pollution in comparison to conventional agriculture.
- The basic standards of organic farming provide suitable tools to minimize environmental pollution and nutrient losses on the farm level, which seem to be more effective measures than in conventional production.
- Regulations concerning housing conditions in organic livestock farming serve as preventive measures against conflict behavior and the incidence of injuries and claw disorders.
- Certification of organic production system, assures the consumer the quality of the products.

Principles of Organic Livestock Production

- Organic livestock farming is a land-based activity. In order to avoid environmental pollution, particularly natural sources such as the soil and water, organic production of livestock must in principle, provide for a close relationship between such production and the land.
- Livestock must have access to free range exercise area and/or grazing apart from specified exemptions.
- Biological diversity should be encouraged and preference should be given to the breeds that are adaptable to local conditions. Genetically modified organisms and products derived from them are not compatible with organic production.
- Organic livestock should be fed on organically produced grass, fodder and other feed stuffs, apart from some specifications (for ruminants 10% of DM of specified components may come from conventional origin).

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- Animal health management should be mainly based on prevention (appropriate breeds, a balanced high-quality diet and a favourable environment in terms of stocking density and husbandry practices). The preventive use of chemically synthesized medication (allopathic medicines) is not generally permitted, but sick and injured animals must be treated immediately as well-being of animals is more important (although this may affect their status with regards to organic certification).
- Housing should satisfy the needs of the animals concerned. Adequate ventilation, light, space and comfort should be provided to permit ample freedom of movement to develop the animal's natural social behavior.

Certified organic livestock producers are required to maintain breeding, feeding, health care, production, slaughter and sales records. This allows for traceability of organic livestock products. Nothing comparable is required in conventional production. All these measures lead to a product (milk, eggs, meat) obtained from animals raised under higher welfare conditions and containing fewer residues (pesticides, veterinary drugs) than the products from conventional rearing systems (Kijlstra *et al.* 2006). Such products can be traced back to the farm giving transparency in the production chain, as well as the possibility to take measurements in case of calamities like food poisoning.

Organic Livestock Farming maintains Sustainability

Sustainable agriculture is a way of raising food, that is healthy for consumers and animals, does not harm the environment, humane for workers and animals, and provides a fair wage to the farmer or farm worker. The characteristics of this type of agriculture include-

- **Conservation and Preservation-** What is taken out of the environment is put back in, so land and resources such as water, soil and air can be replenished and are available to future generations. The waste from sustainable farming stays within the farm's ecosystem should not cause or build up pollution. In addition, sustainable agriculture seeks to minimize transportation costs and fossil fuel use, and is as locally- based as possible.
- **Biodiversity-** farms raise different types of plants and animals, which are rotated around the fields to enrich the soil and help prevent disease and pest out-breaks. Chemical pesticides are severely restricted.
- **Animal Welfare-** animals treated humanly and with respect, and are well cared for. They are permitted to carry out their natural behaviors, such as grazing, rooting or pecking and are fed a natural diet appropriate for their species.

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- **Economically Viable-** Ideally farmers do not depend on market purchased expensive inputs like chemical fertilizers; pesticides as organic production call for more on-farm reliance. Farmers, thus, do not fall prey to loans or meet huge loss situation on account of crop failure, making it economically viable.
- **Socially Just-** Agricultural labourers or animal handlers are treated fairly and paid competitive wages and benefits. They work in a safe environment and are offered proper living conditions and food.

The concept of organic livestock farming can only fulfill the criteria for sustainability, if all requirements on animal health and welfare, together with product quality and ecological soundness, are strongly considered and controlled. Sustainability lies at the heart of organic farming and is one of the major factors determining the acceptability or otherwise specific production practices.

In organic farming, agriculture is often referred to as an agro-ecosystem. An agro-ecosystem is a community of plants and animal interaction with their physical and chemical environments that have been modified by people to produce feed, fibers and other products for human consumption and processing. The goal of organic farming is to design a quilt of agro-ecosystems within a landscape unit, each mimicking the structure and function of local, natural ecosystems, thus, acquiring their resilience and sustainability. Ideally, the organic farmer manipulates the natural ecosystem to achieve sustainable production, using an understanding of ecological relationships while trying to minimize the use of external inputs and harm to the environment.

Although it is possible to create agro-ecosystems without farm animals, animal provide substantial advantages for system productivity and sustainability. For example, farm animals have an important role in processing biomass and recycling nutrients. Due to this role in nutrient recycling, livestock production is an integral part of many organic farms (Hermansen 2003). The concept behind organic livestock production is creating a situation where the livestock contributes to the whole farm system and, at the same time, the system contributes to maintaining the animals' health and welfare and ultimate ability to exhibit its optimum physiological abilities and improve its immunity. The animal in turn contributes to the recycling of nutrients towards ensuring proper resource utilization within the farm system and also improvement in the environment. Unlike conventional farming methods, organic livestock farming rejects the concept of maximizing short-term performance and rather attempts to achieve an optimum life performance of the animal. Organic farming systems with herbivores are generally more productive than those without them. The animals can fill niches that otherwise would not be utilized, for example marginal lands otherwise unsuitable for agriculture. However, in order to create sustainable agro-ecosystems, the animal component must meet certain requirements:-

- The selection of species and breeds must be adapted to crop production suitable for the area, to available resources on the farm or in the region, and to local agro-climatic conditions.
- The number of animals must be balanced in relation to the possible crop production and available resources.
- Rearing systems must be designed to avoid harming the environment and to minimize the use of fossil energy.

Ruminants, such as cattle and sheep, have a particularly important role in agro-ecosystems since they process leguminous forage plants. These are the backbone of organic crop production because of their ability to fix atmospheric nitrogen. To obtain sufficient nitrogen in an organic crop rotation, about one-third of the crops should be legumes. In practice, this means that organic animal production must be based on ruminants (and that these are fed like ruminants). In contrast, monogastric animals, such as pig and poultry, require high quality protein in their diets. These animals can be considered as competing with humans for food, at least to the extent they use protein sources suitable for direct human consumption. Thus, it is sometimes argued that monogastric animals should be considered marginal in organic farming, primarily to be fed on agricultural wastes. Nevertheless, these species are important in organic production and consumption, besides, these animals contribute to the agro-ecosystem by producing useful services, such as biological weed or pest control. To be successful, organic agriculture must integrate plant and livestock production to the extent possible to optimize nutrient use and recycling.

Development approaches for organic animal production in developing countries has to be based on realistic and practical situations. First, one must recognize the limitation and complexities of export market for animal products, while exploring market opportunities for organic animal products locally. For instance, chicken meat and eggs from backyard or indigenous birds fetch better price. Practical approaches for organic farming should be based on and developed from locally existing animal production systems which already have close resemblance to prescribed organic practices, such as those indicated for ruminant and backyard chicken production. The local standards and guidelines for organic animal farming ought to be initially considered and developed from such existing animal husbandry practices. Further, development of such standards will be a continuous process based on practical experiences gained from production, processing, and marketing of the resulted organic animal products. An ideal scenario could be that development of standards for domestic consumption and for export markets, which have to be compliant to the importing country requirements.

The success of the promotion of organic livestock farming at national level will depend on many important factors including government policies and legislative

supports, socio-economic infrastructure, farm training and extension as well as other technical supports. The consumers in developing countries like India are increasingly becoming quality conscious coupled with rising incomes they are ready to pay market premiums for the quality products emerging from organic production.

Organic Livestock Production and Public Health- Consumer Concern

Food Safety has become the number one issue of concern in modern food production. Consumers have become increasingly conscious, most often driven by the large number of safety crises, which especially has hit the meat area (hormones, antibiotics, tranquilizers, dioxin, bovine spongiform encephalopathy (BSE), Verotoxigenic *E.coli* (VTEC), chronic wasting disease) and subsequently exposed by the media. As conventional livestock production practices are frequently examined and criticized in the context of animal disease outbreaks and increasing food safety concerns, there is growing consumer concern toward not only quality of animal products but also towards animal welfare standards. At the same time, outbreaks of various diseases like avian flu, swine flu, Foot and Mouth Disease have induced concern of the general public about the way that food animals are being kept.

A comprehensive “Conception to Consumption” (whole food production chain) approach is the most effective way to address the safety issue in fresh meat production. The importance of traceability of animals and animal products has grown as food production and marketing have been removed further from consumer control. Product traceability requires a transparent chain of custody to maintain credibility and to complete information transfer functions. It consists of two components, i.e. a unique identifiable system and a credible and verifiable mechanism for identification of preservation. Moreover, traceability systems can be divided into subcategories, e.g. country of origin, retail, processor and farm to retail identity. Introduction of the wholesomeness concept in the meat production, most often represented by organic production, is mainly due to wish for reestablishing for a positive meat sector image, e.g. meat safety and animal welfare aspects. Quality features of the product and the production process have direct association with food safety, public health, animal health and animal welfare and next to the more classic, technological quality measures like milk cell counts, bacteria counts, antibiotic residues and freeze point decrease. There are different concepts for quality control like Good Manufacturing Practice (GMP), International Standards Organization (ISO), Hazard Analysis Critical Control Points (HACCP), Total Quality Management (TQM), Codex guidelines, Globalgap etc. Conception to consumption concept will undoubtedly contribute with knowledge of high importance in the development of quality control schemes and implementation of

traceability systems, which are needed to live up to the demands of future customers of animal products. Organic meat production undoubtedly reduces the risk of potential public health problems by prohibiting the use of antibiotics, hormones and pesticides. Brand names, generic names and labeling schemes are all possible ways of providing consumers with additional information about products, and can improve consumers' ability to evaluate the quality at the point of purchase. The organic label provides the assurance that no food ingredient is subjected to irradiation and that genetically modified organisms have been excluded. The increased awareness on personal health, environment and food safety along with enhanced flavour and freshness of organic food products are increasing the demand for these products.

As a consequence of the outbreak of BSE in Canada, United States Department of Agriculture (USDA) started a collaborative initiative through 'The National Animal Identification Team' (NAIT) under the title 'Protecting American Animal Agriculture', which aims to introduce a national registration of farm animals, one of the reasons being to facilitate extermination of livestock diseases and control outbreaks of especially foreign origin. This initiative falls in line with the growing wish for increased traceability by the American consumers. Sooner or later, such requirements would become universal phenomenon, those not complying will only be excluded from global trade in agricultural products especially of livestock origin. Even in case of conventionally produced livestock products, safety considerations are becoming stricter by the day; organic production standards make it even stricter in the best interest of animals, environment and human being who consume animal products.

Merits apart, organic livestock production and other farming systems with outdoor runs can also lead to an increase or re-emergence of certain zoonotic diseases (Campylobacter, Toxo-plasma), while consumers regard organic products to be healthier than conventional foods. Thus, to ensure food safety of organic products, further research on the prevalence of certain zoonotic infections, risk factors, farm management, post slaughter decontamination and consumer perception/education is very important.

Organic Farming and Climate Change

Ten to twelve percent of global greenhouse gas emissions are due to human food production, since agriculture is not only affected by climate change but also contributes to it. Agriculture is the main emitter of nitrous oxides and methane according to current practice and knowledge.

Emissions of nitrous oxide originate mainly from:

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- high soluble nitrogen levels in the soil from synthetic and organic nitrogen sources (fertilizers).
- animal housing and manure management.

The main sources of methane emissions are:

- enteric fermentation by ruminants
- anaerobic turnover in rice paddies.
- manure handling.
- compaction of soils resulting from the use of heavy machinery.
- biomass burning, e.g. from slash-and-burn agriculture, emits both methane and nitrous oxide.

In addition, intensive agriculture leads to deforestation, overgrazing and widespread use of practices that result in soil degradation. These changes in land use contribute considerably to global CO₂ emissions. Sustainable agriculture and food supply systems are thus more urgently needed than ever before. They must boost the capacity of agricultural production to adapt to more unpredictable and extreme weather conditions such as droughts and floods, reduce greenhouse gas emissions in primary food production and halt or reverse carbon losses in soils. Organic systems are highly adaptive to climate change due to the application of traditional skills and farmers' knowledge, soil fertility-building techniques and a high degree of diversity.

According to a FAO report (Livestock's long shadow (FAO 2006)), livestock production is one of the major causes of the world's most pressing environmental problems, including global warming, land degradation, air and water pollution, and loss of biodiversity. Using a methodology that considers the entire commodity chain, it estimates that livestock are responsible for 18 percent of greenhouse gas emissions, a bigger share than that of transport. However, the report says, the livestock sector's potential contribution to solving environmental problems is equally large, and major improvements could be achieved at reasonable cost. To tackle the problems of livestock and crop production in environmentally friendly manner, organic agriculture is claimed to be the most sustainable approach in food production. It emphasizes recycling techniques and low external input and high output strategies. It is based on enhancing soil fertility and diversity at all levels and makes soils less susceptible to erosion. Organic farming links productivity with ecology and creates livelihoods in rural areas: it is a surprisingly multifaceted option. Organic farming is believed to offer the best, currently available, practical model for addressing climate-friendly food production. This is because it sequesters higher levels of carbon in the soil, is less dependent on oil-based fertilizers and pesticides and confers resilience in the face of climatic extremes.

4

Organic Certification Standards

The organic products are labeled as ‘organic’ because they are produced in accordance to certain standards, and it is verified by some authentic or accredited certification agency. As such, an organic label indicates that a product has been certified against specific organic standards. The label carries the name of the certification body and the standards with which it complies, (e.g. EU 2092/91). To the informed consumer, this label can function as a guide. Certification bodies evaluate operations according to different organic standards and can be formally recognized by more than one authoritative body. The label of a given certification body, therefore, informs the consumer on the type of standards complied with during production and processing as well as on the type of recognition granted to the certification body. Organic certification is required for market purposes, especially when distance is more from producers to consumers and there is a need to verify the organic claim. In developing countries, a huge number of producers



Improved rearing conditions enhance production and product quality: Organic standards

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apply organic agriculture practices for their own subsistence purposes but most of these are uncertified farms. It is to be highlighted that refraining from the use of synthetic inputs does not qualify an operation as organic, as far as it is not accompanied by a proper farm design and management that preserves natural resources from degradation. In 2009, 37.2 million hectares were certified organic lands across the world, involving 1.8 million farmers (Willer and Kilcher 2011). Certified organic agriculture is also linked to consumption patterns that seek locally adapted, healthy and ecologically friendly foods and goods. From a consumer's point of view, the organic philosophy of adaptation to local conditions involves a preference for seasonal and local food.

Many certification bodies operate worldwide, most of which are private and originate in developed countries. In India, currently 2 certification agencies are accredited by APEDA, which are engaged in certifying organic production (Annexure). All standards require the prevention of contamination of organic products through contact or mixing with other items. This is assured through careful labeling, separate storage and processing facilities for organic and conventional products, accurate record keeping, and securing chemicals and other substances that could come into contact with the products. In cases where the same facilities are used for processing organic and conventional products, there must be a proper cleaning and sanitizing programme before the transition to processing organic products. At any stage when the packaging of a product is altered, for example by mixing products or processing, or even if the product is merely re-labelled, then that operation must be inspected in the same way as the original production. Thus, as Unwin (2001) points out, "in the livestock sector, milk bottling plants and processing plants, egg packing stations, abattoirs and butchers shops all require certification if they handle organic products. Traceability must also be applied to animal feedstuffs, as a result of decisions to exclude genetically modified materials from organic farming and to ensure that there is no mixing of organic and conventional ingredients, all facilities producing compounded or blended feeds for organic stock must be inspected and certified".

To ensure a credible organic food product is reaching to the consumers, certification agencies develop elaborate mechanisms to monitor production and processing of the product before they approve it. Considering the small farming operations in developing countries, the requirements of organic standards may look a bit more cumbersome but the producers as well as the certifiers have to comply with the requirements albeit some minor location specific changes so long basic philosophy of organic production is not compromised.

International voluntary standards: At the international level, the FAO/WHO Codex Alimentarius Commission (the inter-governmental body that sets standards for all foods) has developed international guidelines for production, processing, labeling and marketing of organically produced foods to guide producers and to

protect consumers against deception and fraud. These guidelines (www.codexalimentarius.net/download/standards/360/cxg_032e.pdf) have been agreed upon by all member states (India included) of the Codex Alimentarius Commission. The private sector's equivalent to the Codex Alimentarius guidelines is the International Basic Standards for Organic Production and Processing, created by the International Federation of Organic Agriculture Movements (IFOAM). Codex Alimentarius and IFOAM guidelines include accepted management principles for the production of plants, livestock, bees and their products (IFOAM makes provisions also for fibers, aquaculture and non-wood forest products); for handling, storage, processing, packaging and transportation of products, and a list of substances permitted in the production and processing of organic foods. These guidelines are regularly reviewed, particularly the criteria for permitted substances and the process by which inspection is carried out and certification held.

National mandatory standards: The Codex Alimentarius and IFOAM guidelines are minimum standards for organic agriculture, intended to guide governments and private certification bodies in standard setting. As such, they can be considered as standard for standards. Governments can use these texts to develop national organic agriculture programmes which are often more detailed as they respond to specific country needs. Most national standards (e.g. EU countries, Japan, Argentina, India, Tunisia, USA), are specified in regulations which are legally binding.

Local voluntary standards. In some countries (e.g. Germany), individual certification bodies may produce their own standards which can be more stringent than the regulation in force, usually in response to specific consumer demands. Although these are not legally enforceable, private certifiers at times may be more restrictive than is required by law.

Accreditation: Accreditation is a procedure by which an authoritative body evaluates and gives formal recognition that a certification programme is in accordance with the standards of the authoritative body. For organic agriculture, certification bodies can apply the voluntary international standards and/or the national mandatory standards and be accredited by the related “authority”. At international level, the International Organic Accreditation Service (IOAS) accredits certification bodies according to IFOAM Accreditation Programme criteria by delivering the “IFOAM Accredited” logo. The IOAS is an independent NGO which ensures global equivalency of certification programmes and attempts to harmonize standards, whilst taking into consideration local differences. It must be noted that membership of IFOAM by certifying bodies does not constitute IOAS accreditation. At national level, governments or national accreditation bodies accredit certification bodies operating in their country, if their country has organic agriculture legislation. Both private and public bodies adhere to the International Organization for Standardization of basic standards for accreditation of certifiers (ISO 65) in addition to their specific requirements.

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Worldwide 532 organizations offer organic certification services, which are mostly based in the European Union, the United States, Japan, South Korea, China, Canada, and Brazil. Most certification bodies are in Europe (37%) followed by Asia (31%) and North America (18%). Forty percent of the certification bodies are approved by the European Union, 32% have ISO 65 accreditation and 28% are accredited under the US National Organic Program (NOP). Under India's National Programme on Organic Production (NPOP) which is notified under Foreign Trade and Development Regulation Act (FTDR) and legally applicable only for exports, 20 certification bodies have been authorized to oversee and certify organic certification process (Annexure). In the absence of any domestic regulation, the same system is being used as de-facto domestic regulation without any legal framework. However, the Government of India is in the process of notifying the organic farming guidelines.

Most of the countries have national certifying body or agencies who certify the production management system as Organic. Without their certification, products cannot reach the consumers as organic. A lot of organic standards exist at present. According to the FiBL survey on organic rules and regulations, the number of countries with organic standards has increased to 74, and there are 27 countries that are in the process of drafting legislation (Willer and Kilcher 2011). But, only some standards got world wide acceptance like EU regulation (1804/1999), Organic Food Products Act (OFPA) of USA, draft guidelines of Codex/ WHO/ FAO, United Kingdom Register of Organic Food Standards (UKROFS) of UK and International Federation of Organic Agricultural Movement (IFOAM) standards. India has also developed its own organic standards among others including animal husbandry, which are largely based on the IFOAM basic standards. In India, in 2000 the National Programme for Organic Production (NPOP) was launched and in May, 2001, the National accreditation programme was notified by the Ministry of Commerce. Agricultural and Processed Food Products Export Development Authority (APEDA), Tea Board, Coffee Board and Spices Board have been designated as the accreditation agencies for organic certification in India. The Indian standards for organic production are acceptable to USA as well as EU countries, which is a remarkable achievement. This status is achieved by only two developing countries, i.e. India and Costa Rica.

Production standards and related legislation provide the opportunity for the sustainability and animal welfare objectives of free-range and organic production systems to be clearly identified, so that consumer preferences with respect to these objectives can be reflected in the market place. The higher prices which producers can achieve when meeting these standards are clearly important, but standards and legislation remain a means to an end rather than an end in themselves. The standards help differentiate the conventional products from those which are produced following and adhering to the standards prescribed for organic livestock production. Certified organic products are those which have been produced, stored, processed, handled

and marketed in accordance with precise technical specifications (standards) and certified as “organic” by a certification body. Once conformity with organic standards has been verified by a certification body, the product is accorded a label. This label will differ depending on the certification body but can be taken as an assurance that the essential elements constituting an “organic” product have been met from the farm to the market. It is important to note that an organic label applies to the production process, ensuring that the product has been produced and processed in an ecologically sound manner. The organic label is therefore a production process claim as opposed to a product quality claim. It should be noted that production standards and legislation are evolving measures subject to continual amendment, thus, the standards discussed hereunder presents the scenario prevailing at the time of writing this book.

IFOAM Norms

The IFOAM is almost a world leader as far as growth of organic movement is concerned. The activities of IFOAM including standards setting has global recognition and repercussions, especially when it has consultative status with many United Nations bodies like FAO, UNDP, UNCTAD, UNEP and UNESCO etc. Among a number of activities IFOAM is involved, standards development is one of its most significant objectives. IFOAM Norms are the IFOAM Basic Standards together with the IFOAM Accreditation Criteria, are a keystone of the organic movement. Democratically and internationally adopted, they reflect the current state of organic production and processing methods. These standards should not be seen as a final statement, but rather as a work in progress to contribute to the continued development and adoption of organic practices throughout the world. The IBS are structured as “standard for standards.” They provide a framework for certification bodies and standard-setting organizations worldwide to develop their own more detailed certification standards which take into account specific local conditions. A glance of the standards of organic agriculture as developed by the IFOAM would reveal how comprehensively, the organic production system is expected to operate. Since IFOAM Basic Standards have universal acceptance worldwide, the standards dealing with animal husbandry extracted from the IFOAM Basic Standards (IBS) version 2005, are being presented as under:

1.1 Animal Management

General Principle

Organic livestock husbandry is based on the harmonious relationship between land, plants and livestock, respect for the physiological and behavioral needs of livestock and the feeding of good-quality organically grown feedstuffs.

Recommendations

The operator should:

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- a. provide adequate good quality organically grown feedstuffs;
- b. maintain appropriate stocking rates, flock or herd sizes, and rotations to allow for natural behavior patterns and to maintain natural resources and environmental quality;
- c. practice methods of animal management that reduce stress, promote animal health and welfare, prevent disease and parasitism, and avoid the use of chemical allopathic veterinary drugs;
- d. apply management practices that promote sustainable land and water use.

Standards shall require that:

- 1.1.1 The operator shall ensure that the environment, the facilities, stocking density and flock/herd size provides for the behavioral needs of the animals and provides for:
 - a. sufficient free movement and opportunity to express normal patterns of behavior;
 - b. sufficient fresh air, water, feed and natural daylight to satisfy the needs of the animals;
 - c. access to resting areas, shelter and protection from sunlight, temperature, rain, mud and wind adequate to reduce animal stress;
 - d. the maintenance of social structures by ensuring that herd animals are not kept in isolation from other animals of the same species;
 - e. construction materials and production equipment that do not significantly harm to human or animal health.

This provision does not apply to small herds for mostly self-sufficient production. Operators may isolate male animals, sick animals and those about to give birth.

- 1.1.2 Housing conditions shall ensure:
 - a. ample access to fresh water and feed according to the needs of the animals;
 - b. animals have sufficient space to stand naturally, lie down easily, turn around, groom themselves and assume all natural postures and movements such as stretching, and wing flapping;
 - c. where animals require bedding, adequate natural materials are provided;
 - d. that construction provides for insulation, heating, cooling and ventilation of the building, that permits air circulation, dust levels, temperature, relative air humidity, and gas concentrations to within levels that are not harmful to the livestock;

- e. that poultry, rabbits and pigs shall not be kept in cages;
- f. that animals are protected from predation by wild and feral animals.

1.1.3 Landless animal husbandry systems are prohibited.

1.1.4 All animals shall have access to pasture or an open-air exercise area or run, whenever the physiological condition of the animal, the weather and the state of the ground permit. Such areas may be partially covered.

Animals may be temporarily confined because of inclement weather or absences of pasture due to temporary or seasonal conditions. Such animals shall still have access to an outdoor run. Animals may be fed with carried fresh fodder where this is a more sustainable way to use land resources than grazing. Animal welfare shall not be compromised.

1.1.5 The maximum hours of artificial light used to prolong natural day length shall not exceed a maximum that respects the natural behavior, geographical conditions and general health of the animals.

1.2 Length of Conversion Period

General Principle

The establishment of organic animal husbandry requires an interim period, the conversion period. Animal husbandry systems that change from conventional to organic production require a conversion period to develop natural behavior, immunity and metabolic functions.

Recommendations

All livestock on an organic farm should be converted to organic production. Conversion should be accomplished over a period of time. Replacement poultry should be brought onto the holding at the start of the production cycle.

Standards shall require that:

- 1.2.1 Animal products may be sold as “product of organic agriculture” only after the land and animals have all met the appropriate established conversion requirements.
- 1.2.2 Land and animals may be converted simultaneously subject to the requirements for all other land and animal conversion periods.
- 1.2.3 Where existing animals on a farm are converted to organic they shall undergo a onetime minimum conversion period at least according to the following schedule:

1.3 *Animals Sources/Origin*

General Principle

Organic animals are born and raised on organic holdings.

Recommendations

Organic animal husbandry should not be dependent on conventional raising systems.

Livestock obtained from off the farm should be from organic farms or as part of an established co-operative program between specific farms to improve herd health and fitness.

Standards shall require that:

1.3.1 Animals shall be raised organically from birth.

When organic livestock is not available conventional animals may be brought in accordance to the following age limits:

- a. 2 day old chickens for meat production;
- b. 18 week old hens for egg production;
- c. 2 weeks for any other poultry;
- d. piglets up to 6 weeks and after weaning;
- e. dairy calves up to 4 weeks old that have received colostrum and are fed a diet consisting mainly of full milk.

1.3.2 Breeding stock may be brought in from conventional farms to a yearly maximum of 10% of the adult animals of the same species on the farm.

Where standards allow for exceptions of more than 10% these shall be limited to:

- a. unforeseen severe natural or man-made events;
- b. considerable enlargement of the farm;
- c. establishment of a new type of animal production on the farm;
- d. holdings with less than 10 animals.

Production conversion period

- meat: 12 months
- dairy: 90 days
- eggs: 42 days

1.4 *Breeds and Breeding*

General Principle

Breeds are adapted to local conditions.

Recommendations

- Breeding goals should encourage and maintain the good health and welfare of the animals consistent with their natural behavior.
- Breeding practices should include methods that do not depend on high technologies invasive to natural behavior and capital intensive methods.
- Animals should be bred by natural reproduction techniques.

Standards shall require that:

- 1.4.1 Breeding systems shall be based on breeds that can reproduce successfully under natural conditions without human involvement.
- 1.4.2 Artificial insemination is permitted.
- 1.4.3 Embryo transfer techniques and cloning are prohibited.
- 1.4.4 Hormones are prohibited to induce ovulation and birth unless applied to individual animals for medical reasons and under veterinary supervision.

1.5 Mutilations

General Principle

Organic farming respects the animal's distinctive characteristics.

Recommendations

- Operators should select species and breeds that do not require mutilation.
- Exceptions for mutilations should only be made when suffering can be kept to the minimum.
- Surgical treatments should only be used for reasons of safety, mitigation of suffering and the health and welfare of the livestock.

Standards shall require that:

- 1.5.1 Mutilations are prohibited.

The following exceptions may be used only if animal suffering is minimized and anesthetics are used where appropriate:

- a. castrations;
- b. tail docking of lambs;
- c. dehorning;
- d. ringing;
- e. mulesing only for breeds that require mulesing.

1.6 *Animal Nutrition*

General Principle

Organic animals receive their nutritional needs from organic forage and feed of good quality.

Recommendations

- Operators should offer a balanced diet that provides all of the nutritional needs of the animals in a form allowing them to exhibit their natural feeding and digestive behavior.
- Organic animals should be fed by-products from the organic food processing industry not suitable for human use.
- Ruminants should receive a balanced diet according to their specific nutritional needs and should not be fed a diet that consists entirely of silage and concentrates.
- All feed should come from the farm itself or be produced within the region.
- Coloring agents in feed should not be used in organic livestock production.
- All animals should have daily access to roughage.

Standards shall require that:

1.6.1 Animals shall be fed organic feed.

Operators may feed a limited percentage of non-organic feed under specific conditions for a limited time in the following cases:

- a. organic feed is of inadequate quantity or quality;
- b. areas where organic agriculture is in early stages of development.

In no case may the percentage of non-organic feed exceed 10% dry matter per ruminant and 15% dry matter per non-ruminant calculated on an annual basis. Operators may feed a limited percentage of non-organic feed under specific conditions for a limited time in the following cases:

- a. unforeseen severe natural or man-made events;
- b. extreme climatic or weather conditions.

1.6.2 The prevailing part (at least more than 50%) of the feed shall come from the farm unit itself or be produced in co-operation with other organic farms in the region.

The standard-setting organization may allow exceptions with regard to local and regional conditions, and shall set a time limit.

- 1.6.3 For the calculation of feeding allowances only, feed produced on the farm unit during the first year of organic management may be classed as organic. This refers only to feed for animals that are being produced within the farm unit. Such feed may not be sold or otherwise marketed as organic.
- 1.6.4 The following substances are prohibited in the diet:
- a. farm animal by-products (e.g. abattoir waste) to ruminants;
 - b. slaughter products of the same species;
 - c. all types of excrements including droppings, dung or other manure;
 - d. feed subjected to solvent extraction (e.g. hexane) or the addition of other chemical agents;
 - e. amino-acid isolates;
 - f. urea and other synthetic nitrogen compounds;
 - g. synthetic growth promoters or stimulants;
 - h. synthetic appetizers;
 - i. preservatives, except when used as a processing aid;
 - j. artificial colouring agents.
- 1.6.5 Animals may be fed vitamins, trace elements and supplements from natural sources.

Synthetic vitamins, minerals and supplements may be used when natural sources are not available in sufficient quantity and quality.

- 1.6.6 All ruminants shall have daily access to roughage.
- 1.6.7 Fodder preservatives such as the following may be used:
- a. bacteria, fungi and enzymes;
 - b. by-products of food industry (e.g. molasses);
 - c. plant based products.

Synthetic chemical fodder preservatives such as acetic, formic and propionic acid and vitamins and mineral are permitted in severe weather conditions.

- 1.6.8 Young stock from mammals shall be provided maternal milk or organic milk from their own species and shall be weaned only after a minimum time that takes into account the natural behavior of the relevant animal species.

Operators may provide non-organic milk when organic milk is not available. Operators may provide milk replacers or other substitutes only in emergencies provided that they do not contain antibiotics, synthetic additives or slaughter products.

1.7 Veterinary Medicine

General Principle

Organic management practices promote and maintain the health and well-being of animals through balanced organic nutrition, stress-free living conditions and breed selection for resistance to diseases, parasites and infections.

Recommendations

Operators should maintain animal health and practice disease prevention through the following techniques:

- a. selection of appropriate breeds or strains of animals;
- b. adoption of animal husbandry practices appropriate to the requirements of each species, such as regular exercise and access to pasture and/or open-air runs, to encourage the natural immunological defense of animal to stimulate natural immunity and tolerance to diseases;
- c. provision of good quality organic feed;
- d. appropriate stocking densities;
- e. grazing rotation and management.

Operators should use natural medicines and treatments, including homeopathy, Ayurvedic medicine and acupuncture whenever appropriate. When illness does occur, an operator should determine the cause and prevent future outbreaks by adopting appropriate management practices.

Standards shall require that:

- 1.7.1 The operator shall take all practical measures to ensure the health and well being of the animals through preventative animal husbandry practices.
- 1.7.2 If an animal becomes sick or injured despite preventative measures that animal shall be treated promptly and adequately, if necessary in isolation and in suitable housing. Producers shall not withhold medication where it will result in unnecessary suffering of the livestock, even if the use of such medication will cause the animal to lose its organic status.

An operator may use chemical allopathic veterinary drugs or antibiotics only if:

- a. preventive and alternative practices are unlikely to be effective to cure sickness or injury;
 - b. they are used under the supervision of a veterinarian, and
 - c. withholding periods shall be not less than double of that required by legislation, or a minimum of 48 hours, whichever is longer.
- 1.7.3 Substances of synthetic origin used to stimulate production or suppress of natural growth are prohibited.
- 1.7.4 Vaccinations are allowed with the following limitations:
- a. when an endemic disease is known or expected to be a problem in the region of the farm and where this disease cannot be controlled by other management techniques, or
 - b. when a vaccination is legally required, and
 - c. the vaccine is not genetically engineered.

1.8 *Transport and Slaughter*

General Principle

Organic animals are subjected to minimum stress during transport and slaughter.

Recommendations

Animals should be transported with the minimum frequencies and distances possible. Animals should be inspected regularly during transport. The transportation medium should be appropriate for each animal. Animals should be watered and fed during transport depending on weather and other conditions of transport. Those responsible for transportation and slaughtering should employ stress-reducing measures, such as:

- a. allowing sufficient rest time to reduce stress;
- b. maintaining existing group and social ties;
- c. avoiding contact (sight, sound or smell) of each live animal with dead animals or animals in the killing process. Each animal should be stunned before being bled to death. The equipment used for stunning should be in good working order. Exceptions can be made according to cultural practice. Where animals are bled without prior stunning this should take place in a calm environment. Local and mobile slaughterhouses should be used when available.

Standards shall require that:

- 1.8.1 Animals be handled calmly and gently during transport and slaughter.

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- 1.8.2 The use of electric prods and other such instruments is prohibited.
- 1.8.3 Organic animals be provided with conditions during transportation and slaughter that reduce and minimize the adverse effects of:
- a. stress;
 - b. loading and unloading;
 - c. mixing different groups of animals or animals of different sex;
 - d. quality and suitability of mode of transport and handling equipment;
 - e. temperatures and relative humidity;
 - f. hunger and thirst, and
 - g. the specific needs of each animal.
- 1.8.4 Animals shall not be treated with synthetic tranquilizers or stimulants prior to or during transport.
- 1.8.5 Each animal or group of animals shall be identifiable at each step in the transport and slaughter process.
- 1.8.6 Slaughterhouse journey times shall not exceed eight hours.

When there is no certified organic slaughterhouse within eight hours travel time, an animal may be transported for a period in excess.

Guidelines of Codex Alimentarius for Organically Produced Livestock and Livestock Products

Among others, guidelines for organic production are also developed by The Codex Alimentarius commission (www.codexalimentarius.net/download/standards/360/cxg_032e.pdf). The Codex Alimentarius Commission is an intergovernmental body with over 170 members, within the framework of the Joint FAO/WHO Food Standards Programme established by the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO), with the purpose of protecting the health of consumers and ensuring fair practices in the food trade. The Commission also promotes coordination of all food standards work undertaken by international governmental and non-governmental organizations. The *Codex Alimentarius* (Latin, meaning Food Code) is the result of the Commission's work: a collection of internationally adopted food standards, guidelines, codes of practice and other recommendations.

Food labelling is the primary means of communication between the producer and seller of food on one hand, and the purchaser and consumer on the other. The Codex Alimentarius standards and guidelines on food labeling are published in a

specific volume: *Food Labelling*. In addition to the general recommendations, the Codex Committee on Food Labelling also provides guidance for certain claims commonly found in the market in order to provide clear information to the consumer.

The Codex Committee on Food Labelling developed the *Guidelines for the Production, Processing, Labelling and Marketing of Organically Produced Foods* in view of the growing production and international trade in organically produced foods with a view to facilitating trade and preventing misleading claims. The Guidelines are intended to facilitate the harmonization of requirements for organic products at the international level, and may also provide assistance to governments wishing to establish national regulations in this area. The *Guidelines* include general sections describing the organic production concept and the scope of the text; description and definitions; labeling and claims (including products in transition/conversion); rules of production and preparation, including criteria for the substances allowed in organic production; inspection and certification systems; and import control. The Codex Alimentarius Commission adopted the *Guidelines for the Production, Processing, Labelling and Marketing of Organically Produced Foods* at its 23rd Session in 1999, with the exception of the provisions for livestock and livestock products that were adopted at its 24th Session in 2001 (Codex Alimentarius 2010), given as under:

Codex Alimentarius Guidelines for Livestock and Livestock Products

General Principles

1. Where livestock for organic production are maintained, they should be an integral part of the organic farm unit and should be raised and held according to these guidelines.
2. Livestock can make an important contribution to an organic farming system by:
 - a. improving and maintaining the fertility of the soil;
 - b. managing the flora through grazing;
 - c. enhancing biodiversity and facilitating complementary interactions on the farm; and
 - d. increasing the diversity of the farming system.
3. Livestock production is a land related activity. Herbivores must have access to pasture and all other animals must have access to open-air runs; the competent authority may allow exceptions when the animals' physiological state, inclement weather conditions, and state of the land so permit, or the structure of certain 'traditional' farming systems restrict access to pasture, providing the welfare of the animals can be guaranteed.

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4. Stocking rates for livestock should be appropriate for the region in question taking into consideration feed production capacity, stock health, nutrient balance, and environmental impact.
5. Organic livestock management should aim to utilize natural breeding methods, minimize stress, prevent disease, progressively eliminate the use of chemical allopathic veterinary drugs (including antibiotics), reduce the feeding of animals with products of animal origin (e.g. meat meal), and maintain animal health and welfare.

Livestock sources/origin

1. The choice of breeds, strains and breeding methods shall be consistent with the principles of organic farming, taking into account in particular:
 - a. their adaptation to the local conditions;
 - b. their vitality and resistance to disease;
 - c. the absence of specific diseases or health problems associated with some breeds and strains (porcine stress syndrome, spontaneous abortion etc).
2. Livestock used for products satisfying Section 1.1 (a) of these guidelines must come, from birth or hatching, from production units complying with these guidelines, or have been the offspring of parents raised under the conditions set down in these guidelines. They must be raised under this system throughout their life.
 - a. Livestock may not be transferred between organic and non-organic units. The competent authority can establish detailed rules for the purchase of livestock from other units complying with these Guidelines.
 - b. Livestock existing on the livestock production unit, but not complying with these Guidelines, may be converted.
3. When an operator can demonstrate to the satisfaction of the official or officially recognized inspection/certification body that livestock satisfying the requirements indicated in the previous paragraph are not available, the official or officially recognized inspection/ certification body may allow livestock not raised according to these guidelines under circumstances such as:
 - a. for considerable expansion of the farm, when a breed is changed or when new livestock specialization is developed;
 - b. for the renewal of a herd, e.g. high mortality of animals caused by catastrophic circumstances;
 - c. males for breeding.

The competent authority may set the specific conditions under which livestock from non-organic sources may be allowed or not allowed, taking into account that animals be brought in as young as possible as soon as they are weaned.

4. These livestock qualified by the derogations indicated in the previous paragraph must comply with the conditions set out in paragraph 12. These conversion periods must be observed if the products are to be sold as organic according to Section 3 of these guidelines.

Conversion

1. The conversion of the land intended for feeding crops or pasture must comply with the rules set out in Part A paragraphs 1, 2, and 3 of this Annex.
2. The competent authority may reduce the conversion periods or conditions established in paragraph 10 (for the land) and/or paragraph 12 (for livestock and livestock products) in the following cases:
 - a. pasture, open-air runs and exercise areas used by non-herbivore species;
 - b. for bovine, equine, ovine and caprine coming from extensive husbandry during an implementation period established by the competent authority or dairy herds converted for the first time;
 - c. if there is simultaneous conversion of livestock and land used only for feeding within the same unit, the conversion period for both livestock, pasture and/or land used for animal feed, may be reduced to two years only in the case where the existing livestock and their offspring are fed mainly with products from the unit.
3. Once the land has reached organic status and livestock from a non-organic source is introduced, and if the products are to be sold as organic, such livestock must be reared according to these Guidelines for at least the following compliance periods:

Bovine and Equine

Meat products: 12 months and at least $\frac{3}{4}$ of their life span in the organic management system;

Calves for meat production: 6 months when brought in as soon as they are weaned and less than 6 months old;

Milk products: 90 days during the implementation period established by the competent authority, after that, six months.

Ovine and caprine

Meat products: six months;

Milk products: 90 days during the implementation period established by the competent authority, after that, six months.

Porcine

Meat products: Six months.

Poultry/laying hens

Meat products: whole of life span as determined by the competent authority;

Eggs: six weeks.

Nutrition

1. All livestock systems should provide the optimum level of 100% of the diet from feedstuffs (including 'in conversion' feedstuffs) produced to the requirements of these guidelines.
2. For an implementation period to be set by the competent authority, livestock products will maintain their organic status providing feed, consisting of at least 85% for ruminants and 80% for non-ruminants and calculated on a dry matter basis, is from organic sources produced in compliance with these Guidelines.
3. Notwithstanding the above, where an operator can demonstrate to the satisfaction of the official or officially recognized inspection/certification body that feedstuffs satisfying the requirement outlined in paragraph 13 above are not available, as a result of, for example, unforeseen severe natural or manmade events or extreme climatic weather conditions, the inspection/certification body may allow a restricted percentage of feedstuffs not produced according to these guidelines to be fed for a limited time, providing it does not contain genetically engineered/modified organisms or products thereof. The competent authority shall set both the maximum percentage of non-organic feed allowed and any conditions relating to this derogation.
4. Specific livestock rations should take into account:
 - a. the need of young mammals for natural, preferably maternal milk;
 - b. that a substantial proportion of dry matter in the daily rations of herbivores needs to consist of roughage, fresh or dried fodder, or silage;
 - c. that polygastric animals should be not fed silage exclusively;
 - d. the need for cereals in the fattening phase of poultry;
 - e. the need for roughage, fresh or dried fodder or silage in the daily ration for pigs and poultry.
5. All livestock must have ample access to fresh water to maintain the full health and vigour of the livestock.

6. If substances are used as feedstuffs, nutritional elements, feed additives or processing aids in the preparation of feedstuffs, the competent authority shall establish a positive list/s of substances in compliance with the following criteria:

General Criteria

- a. substances are permitted according to national legislation on animal feeding;
- b. substances are necessary/essential to maintain animal health, animal welfare and vitality; and such substances:
 - contribute to an appropriate diet fulfilling the physiological and behavioural needs of the species concerned; and
 - do not contain genetically engineered/modified organisms and products thereof; and are primarily of plant, mineral or animal origin.

Specific Criteria for Feedstuffs and Nutritional Elements

- a. feedstuffs of plant origin from non-organic sources can only be used, under the conditions of paragraphs 14 and 15, if they are produced or prepared without the use of chemical solvents or chemical treatment;
- b. feedstuffs of mineral origin, trace elements, vitamins, or provitamins can only be used if they are of natural origin. In case of shortage of these substances, or in exceptional circumstances, chemically well-defined analogic substances may be used;
- c. feedstuffs of animal origin, with the exception of milk and milk products, fish, other marine animals and products derived there from should generally not be used or, as provided by national legislation. In any case, the feeding of mammalian material to ruminants is not permitted with the exception of milk and milk products;
- d. synthetic nitrogen or non-protein nitrogen compounds shall not be used.

Specific Criteria for Additives and Processing Aids

- a. binders, anti-caking agents, emulsifiers, stabilizers, thickeners, surfactants, coagulants: only natural sources are allowed;
- b. antioxidants: only natural sources are allowed;
- c. preservatives: only natural acids are allowed;
- d. colouring agents (including pigments), flavours and appetite stimulants: only natural sources are allowed;

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- e. probiotics, enzymes and micro-organisms are allowed;
- f. antibiotics, coccidiostats, medicinal substances, growth promoters or any other substance intended to stimulate growth or production shall not be used in animal feeding.
- g. Silage additives and processing aids may not be derived from genetically engineered / modified organisms or products thereof, and may be comprised only:
 - sea salt;
 - coarse rock salt;
 - yeasts;
 - enzymes;
 - whey;
 - sugar; or sugar products such as molasses;
 - honey;
 - lactic, acetic, formic and propionic bacteria, or their natural acid product when the weather conditions do not allow for adequate fermentation, and with approval of the competent authority.

Health Care

1. Disease prevention in organic livestock production shall be based on the following principles:
 - a. the choice of appropriate breeds or strains of animals as detailed in paragraph 6 above;
 - b. the application of animal husbandry practices appropriate to the requirements of each species, encouraging strong resistance to disease and the prevention of infections;
 - c. the use of good quality organic feed, together with regular exercise and access to pasture and/or open-air runs, having the effect of encouraging the natural immunological defence of the animal;
 - d. ensuring an appropriate density of livestock, thus avoiding overstocking and any resulting animal health problems.
2. If, despite the above preventative measures, an animal becomes sick or injured it must be treated immediately, if necessary in isolation and in suitable housing. Producers should not withhold medication where it will result in unnecessary suffering of the livestock, even if the use of such medication will cause the animal to lose its organic status.

3. The use of veterinary medicinal products in organic farming shall comply with the following principles:
 - a. where specific disease or health problems occur, or may occur, and no alternative permitted treatment or management practice exists, or, in cases required by law, vaccination of livestock, the use of parasiticides, or therapeutic use of veterinary drugs are permitted;
 - b. phytotherapeutic (excluding antibiotics), homeopathic or ayurvedic products and trace elements shall be used in preference to chemical allopathic veterinary drugs or antibiotics, provided that their therapeutic effect is effective for the species of animal and the condition for which the treatment is intended;
 - c. if the use of the above products is unlikely to be effective in combating illness or injury, chemical allopathic veterinary drugs or antibiotics may be used under the responsibility of a veterinarian; withholding periods should be the double of that required by legislation with, in any case, a minimum of 48 hours;
 - d. the use of chemical allopathic veterinary drugs or antibiotics for preventative treatments is prohibited.
4. Hormonal treatment may only be used for therapeutic reasons and under veterinary supervision.
5. Growth stimulants or substances used for the purpose of stimulating growth or production are not permitted.

Livestock Husbandry, Transport and Slaughter

1. Maintenance of livestock should be guided by an attitude of care, responsibility and respect for living creatures.
2. Breeding methods should be in compliance with the principles of organic farming taking into account:
 - a. the breeds and strains suitable for raising under local conditions and under an organic system;
 - b. the preference for reproduction through natural methods, although artificial insemination may be used;
 - c. that embryo transfer techniques and the use of hormonal reproductive treatment shall not be used;
 - d. that breeding techniques employing genetic engineering must not be used.

3. Operations such as attaching elastic bands to the tails of sheep, tail-docking, cutting of teeth, trimming of beaks and dehorning are generally not allowed in the organic management system. Some of these operations may, however, be authorized in exceptional circumstances by the competent authority or its delegate, for reasons of safety (e.g. dehorning in young animals) or if they are intended to improve the health and welfare of the livestock. Such operations must be carried out at the most appropriate age and any suffering to the animals must be reduced to a minimum. Anaesthetic should be used where appropriate. Physical castration is allowed in order to maintain the quality of products and traditional production practices (meat-type pigs, bullocks, capons, etc) but only under these conditions.
4. The living conditions and the management of the environment should take into account the specific behavioral needs of the livestock and provide for:
 - sufficient free movement and opportunity to express normal patterns of behaviour;
 - company of other animals, particularly of like kind;
 - the prevention of abnormal behaviour, injury and disease;
 - arrangements to cover emergencies such as the outbreaks of fire, the breakdown of essential mechanical services and the disruption of supplies.
5. The transport of living stock should be managed in a calm and gentle way and in a manner which avoids stress, injury and suffering: the competent authority should establish specific conditions in order to meet these objectives and may establish maximum transport periods. In transporting livestock, the use of electric stimulation or allopathic tranquilizers is not permitted.
6. The slaughter of livestock should be undertaken in a manner which minimizes stress and suffering, and in accordance with national rules.

Housing and Free-range Conditions

1. Housing for livestock will not be mandatory in areas with appropriate climatic conditions to enable animals to live outdoors.
2. Housing conditions should meet the biological and behavioural needs of the livestock by providing:
 - easy access to feeding and watering;
 - insulation, heating, cooling and ventilation of the building to ensure that air circulation, dust level, temperature, relative air humidity and gas concentration are kept within limits which are not harmful to the livestock;
 - plentiful natural ventilation and light to enter.

3. Livestock may be temporarily confined during periods of inclement weather, when their health, safety or well being could be jeopardized, or to protect plant, soil and water quality.
4. The stocking density in buildings should:
 - provide for the comfort and well being of the livestock having regard for the species, the breed and the age of the livestock;
 - take into account the behavioural needs of the livestock with respect to the size of the group and the sex of the livestock;
 - provide them with sufficient space to stand naturally, lie down easily, turn round, groom themselves, and assume all natural postures and movements such as stretching and wing flapping.
5. Housing, pens, equipment and utensils should be properly cleaned and disinfected to prevent cross infection and the build-up of disease carrying organisms.
6. Free-range, open-air exercise areas or open-air runs should, if necessary, provide sufficient protection against rain, wind, sun and extreme temperatures, depending on the local weather conditions and the breed concerned.
7. The outdoor stocking density of livestock kept on pasture, grassland, or other natural or semi-natural habitats, must be low enough to prevent degradation of the soil and over-grazing of vegetation.

Mammals

1. All mammals must have access to pasture or an open-air exercise area or run which may be partially covered, and they must be able to use those areas whenever the physiological condition of the animal, the weather conditions and the state of the ground permit.
2. The competent authority may grant exceptions for:
 - the access of bulls to pasture or, in case of cows to an open-air exercise area or run during the winter period;
 - the final fattening phase.
3. Livestock housing must have smooth, but not slippery floors. The floor must not be entirely of slatted or grid construction.
4. The housing must be provided with a comfortable, clean and dry laying/rest area of sufficient size, consisting of a solid construction. Ample dry bedding strewn with litter material must be provided in the rest area.

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5. The housing of calves in individual boxes and the tethering of livestock are not permitted without the approval of the competent authority.
6. Sows must be kept in groups, except in the last stages of pregnancy and during the suckling period. Piglets may not be kept on flat decks or in piglet cages. Exercise areas must permit dunging and rooting by the animals.
7. The keeping of rabbits in cages is not permitted.

Poultry

1. Poultry must be reared in open-range conditions and have free access to open-air run whenever the weather conditions permit. The keeping of poultry in cages is not permitted.
2. Water fowl must have access to a stream, pond or lake whenever the weather conditions permit.
3. Housing for all poultry should provide an area of solid construction covered with litter material such as straw, wood shavings, sand or turf. A sufficiently large part of the floor area must be available to laying hens for the collection of droppings, perches/higher sleeping areas of a size and number commensurate with the species and size of the group and of the birds and exit/entry holes of an adequate size must be provided.
4. In the case of laying hens, when natural day length is prolonged by artificial light, the competent authority shall prescribe maximum hours respective to species, geographical considerations and general health of the animals.
5. For health reasons, between each batch of poultry reared buildings should be emptied, and runs left empty to allow the vegetation to grow back.

Manure Management

1. Manure management practices used to maintain any area in which livestock are housed, penned or pastured should be implemented in a manner that:
 - a. minimizes soil and water degradation;
 - b. does not significantly contribute to contamination of water by nitrates and pathogenic bacteria;
 - c. optimizes recycling of nutrients; and
 - d. does not include burning or any practice inconsistent with organic practices.
2. All manure storage and handling facilities, including composting facilities should be designed, constructed and operated to prevent contamination of ground and/or surface water.

3. Manure application rates should be at levels that do not contribute to ground and/ or surface water contamination. The competent authority may establish maximum application rates for manure or stocking densities. The timing of application and application methods should not increase the potential for run-off into ponds, rivers and streams.

Record Keeping and Identification

1. The operator should maintain detailed and up-to-date records as set out in Annex 3, Paras 7–15, given below:
2. All livestock should be identified individually or, in the case of small mammals or poultry, by herd or flock or in the case of bees by hive. Written and/or documentary accounts should be kept to enable tracking of livestock and bee colonies within the system at all times and to provide adequate traceback for audit purpose. The operator should maintain detailed and up-to-date records of:
 - a. breeding and/or origins of livestock;
 - b. registration of any purchases;
 - c. the health plan to be used in the prevention and management of disease, injury and reproductive problems;
 - d. all treatments and medicines administered for any purpose, including quarantine periods and identification of treated animals or hives;
 - e. feed provided and the source of the feedstuffs;
 - f. stock movements within the unit and hive movements within designated forage areas as identified on maps;
 - g. transportation, slaughter and/or sales.
 - h. extraction, processing and storing of all bee products.
3. Storage, on the unit, of input substances, other than those whose use is with paragraph 4.1(b) of these guidelines is prohibited.
4. The official or officially recognized certification body or authority should ensure that a full physical inspection is undertaken, at least once a year, of the unit. Samples for testing of products not listed in these guidelines may be taken where their use is suspected. An inspection report should be drawn up after each visit. Additional occasional unannounced visits should also be undertaken according to need or at random.

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5. The operator should give the certification body or authority, for inspection purposes, access to the storage and production premises and to the parcels of land, as well as to the accounts and relevant supporting documents. The operator should also provide the inspection body with any information deemed necessary for the purposes of the inspection.
6. Products referred to in Section 1 of these guidelines which are not in their packaging for the end consumer should be transported in a manner which should prevent contamination or substitution of the content with substances or product not compatible with these guidelines and the following information, without prejudice to any other indications required by law:
 - the name and address of the person responsible for the production or preparation of the product;
 - the name of the product; and
 - that the product is of organic status.
7. Where an operator runs several production units in the same area (parallel cropping), units in the area producing crop, crop products not covered by Section 1 should also be subject to the inspection arrangements as regards the dash points of paragraph 4 and paragraphs 6 and 8 above. Plants of indistinguishable varieties as those produced at the unit referred to in paragraph 3 above should not be produced at these units:
 - If derogations are allowed by the competent authority, the authority must specify the types of production and circumstances for which derogations are granted and the supplementary inspection requirements, such as unannounced site visits; extra inspections during harvest; additional documentary requirements; assessment of an operation's ability to prevent co-mingling, etc., which are to be implemented.
 - Pending further review of these guidelines in accordance with Section 8, member countries can accept parallel cropping of the same variety, even if it is not distinguishable, subject to adequate inspection measures being applied.
8. In organic livestock production, all livestock on one and the same production unit must be reared in accordance with the rules laid down in these Guidelines. However, livestock not reared in accordance with these Guidelines may be present on the organic holding provided that they are separated clearly from livestock produced in accordance with these Guidelines. The competent authority can prescribe more restrictive measures, such as different species.
9. The competent authority may accept that animals reared in accordance with the provisions of these Guidelines may be grazed on common land, provided that:

- a. this land has not been treated with products other than those allowed in accordance with Section 4.1 (a) and (b) of these Guidelines, for at least three years;
 - b. a clear segregation between the animals reared in accordance with the provisions of these Guidelines, and the other animals can be organized.
10. For livestock production, the competent authority should ensure, without prejudice to the other provisions in this Annex, that the inspections related to all stages of production and preparation up to the sale to the consumer ensure, as far as technically possible, the traceability of livestock and livestock products from the livestock production unit through processing and any other preparation until final packaging and/or labelling.

The European Standards (EU Regulation): The Organic Livestock Production Rules

The European Union (EU) has elaborate, comprehensive and most dynamic organic legislation, guidelines and a vibrant organic production sector, wherein, significant organic production and processing including of organic livestock production can be clearly observed across different EU countries. On 28 June 2007, the Council of the EU approved a proposal for a new Regulation on organic production and labeling, which had been developed since 2005. The new Regulation improves clarity for both organic farmers and consumers and sets out a complete set of objectives, principles and basic rules for organic production. It is said to be transparent and allow a certain amount of flexibility to take account of regional differences in climate and conditions.

Under the new Regulation, producers of organic food in the EU are obliged to use the EU organic logo. Importers of organic food may choose to use the EU logo. The EU logo will in all cases be combined with an indication of origin. At least 95 percent of the agricultural ingredients of the final product will have to be organic for it to be labelled as such. All other final food products produced according to the rules may carry references to organic ingredients in the ingredient list only. The use of GMOs in organic production is completely forbidden. Products containing GMOs will not be able to be labelled as organic, except those containing up to 0.9 percent of GMO residues through accidental contamination. Imports of organic products would be allowed if they come with the same or equivalent guarantees from the country of origin.

Once the new Regulation is applied, it will be accompanied by a set of detailed implementing rules that will govern how it should be applied, in practical terms, to the organic farming sector and its members. The new Regulation responds to the conclusions of the Council of October 2004 on the European Action Plan for organic food and farming of June 2004, which provided an overall strategic vision for

organic farming's contribution to the EU's Common Agricultural Policy. For the import regime, the new rules have applied since 1 January 2007. The new Regulation (Council Regulation (EC) No 834/2007, on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91) is effective from 1 January 2009. The livestock production rules as contained in Article 14 of this new regulation have been reproduced below:

The EU Organic Livestock Production Rules (Article 14)

1. In addition to the general farm production rules laid down in Article 11 (it should be referred for more details), the following rules shall apply to livestock production:
 - a. **with regard to the origin of the animals:**
 - i. Organic livestock shall be born and raised on organic holdings;
 - ii. for breeding purposes, non-organically raised animals may be brought onto a holding under specific conditions. Such animals and their products may be deemed organic after compliance with the conversion period referred to in Article 17(1)(c);
 - iii. animals existing on the holding at the beginning of the conversion period and their products may be deemed organic after compliance with the conversion period referred to in Article 17(1)(c);
 - b. **with regard to husbandry practices and housing conditions:**
 - i. personnel keeping animals shall possess the necessary basic knowledge and skills as regards the health and the welfare needs of the animals;
 - ii. husbandry practices, including stocking densities, and housing conditions shall ensure that the developmental, physiological and ethological needs of animals are met;
 - iii. the livestock shall have permanent access to open air areas, preferably pasture, whenever weather conditions and the state of the ground allow this unless restrictions and obligations related to the protection of human and animal health are imposed on the basis of Community legislation;
 - iv. the number of livestock shall be limited with a view to minimising overgrazing, poaching of soil, erosion, or pollution caused by animals or by the spreading of their manure;
 - v. organic livestock shall be kept separate from other livestock. However, grazing of common land by organic animals and of organic land by non-organic animals is permitted under certain restrictive conditions;

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- vi. tethering or isolation of livestock shall be prohibited, unless for individual animals for a limited period of time, and in so far as this is justified for safety, welfare or veterinary reasons;
- vii. duration of transport of livestock shall be minimised;
- viii. any suffering, including mutilation, shall be kept to a minimum during the entire life of the animal, including at the time of slaughter;
- ix. apiaries shall be placed in areas which ensure nectar and pollen sources consisting essentially of organically produced crops or, as appropriate, of spontaneous vegetation or non-organically managed forests or crops that are only treated with low environmental impact methods. Apiaries shall be kept at sufficient distance from sources that may lead to the contamination of beekeeping products or to the poor health of the bees;
- x. hives and materials used in beekeeping shall be mainly made of natural materials;
- xi. the destruction of bees in the combs as a method associated with the harvesting of beekeeping products is prohibited;

c. with regard to breeding:

- i. reproduction shall use natural methods. Artificial insemination is however allowed;
- ii. reproduction shall not be induced by treatment with hormones or similar substances, unless as a form of veterinary therapeutic treatment in case of an individual animal;
- iii. other forms of artificial reproduction, such as cloning and embryo transfer, shall not be used;
- iv. appropriate breeds shall be chosen. The choice of breeds shall also contribute to the prevention of any suffering and to avoiding the need for the mutilation of animals;

d. with regard to feed:

- i. primarily obtaining feed for livestock from the holding where the animals are kept or from other organic holdings in the same region;
- ii. livestock shall be fed with organic feed that meets the animal's nutritional requirements at the various stages of its development. A part of the ration may contain feed from holdings which are in conversion to organic farming;
- iii. with the exception of bees, livestock shall have permanent access to pasture or roughage;

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- iv. non organic feed materials from plant origin, feed materials from animal and mineral origin, feed additives, certain products used in animal nutrition and processing aids shall be used only if they have been authorised for use in organic production under Article 16;
- v. growth promoters and synthetic amino-acids shall not be used;
- vi. suckling mammals shall be fed with natural, preferably maternal, milk;

e. with regard to disease prevention and veterinary treatment:

- i. disease prevention shall be based on breed and strain selection, husbandry management practices, high quality feed and exercise, appropriate stocking density and adequate and appropriate housing maintained in hygienic conditions;
- ii. disease shall be treated immediately to avoid suffering to the animal; chemically synthesised allopathic veterinary medicinal products including antibiotics may be used where necessary and under strict conditions, when the use of phytotherapeutic, homeopathic and other products are inappropriate. In particular restrictions with respect to courses of treatment and withdrawal periods shall be defined;
- iii. the use of immunological veterinary medicines is allowed;
- iv. treatments related to the protection of human and animal health imposed on the basis of Community legislation shall be allowed;

f. with regard to cleaning and disinfection:

Products for cleaning and disinfection in livestock buildings and installations, shall be used only if they have been authorized for use in organic production under Article 16.

- 2. The measures and conditions necessary for the implementation of the production rules contained in this Article shall be adopted in accordance with the procedure referred to in Article 37(2).

The US Standards for Organic Production -National Organic Programme (NOP) Regulation

In the United States, the National Organic Program (NOP) is the federal regulatory framework governing organic food. It was made law in October and is administered by the United State Department of Agriculture (USDA). The Organic Food

Production Act of 1990 (7 U.S.C.A. § 6501-22) required that the USDA develop national standards for organic products. The regulations (7 C.F.R. Part 205) are enforced by the USDA through the National Organic Program under this act. It covers in detail all aspects of food production, processing, delivery and retail sale. Under the NOP, farmers and food processors who wish to use the word “organic” in reference to their businesses and products, must be certified organic. Producers with annual sales not exceeding \$5,000 US are exempted and do not require certification (however, they must still follow NOP standards, including keeping records and submitting to a production audit if requested, and cannot use the term *certified organic*). A USDA Organic seal identifies products with at least 95% organic ingredients.

There are currently 56 U.S. domestic certification agencies accredited by the USDA, including Organic Crop Improvement Association, CCOF, Quality Assurance International (QAI), and Indiana Certified Organic. There are also 41 accredited foreign agencies that offer organic certification services. The NOP covers fresh and processed agricultural food products, including crops and livestock. It does not cover non-food products that may be sold as organic, including natural fibers (eg: organic cotton), and health and beauty products (eg: organic shampoo). The production, processing and labelling requirements concerning organic livestock production as indicated in NOP are mentioned as under:

Origin of Livestock

- a. Livestock products that are to be sold, labeled, or represented as organic must be from livestock under continuous organic management from the last third of gestation or hatching: *Except, That:*
 1. **Poultry:** Poultry or edible poultry products must be from poultry that has been under continuous organic management beginning no later than the second day of life;
 2. **Dairy animals:** Milk or milk products must be from animals that have been under continuous organic management beginning no later than 1 year prior to the production of the milk or milk products that are to be sold, labeled, or represented as organic, *Except,*
 - i. That, crops and forage from land, included in the organic system plan of a dairy farm, that is in the third year of organic management may be consumed by the dairy animals of the farm during the 12-month period immediately prior to the sale of organic milk and milk products; and
 - ii. That, when an entire, distinct herd is converted to organic production, the producer may, provided no milk produced under this subparagraph

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enters the stream of commerce labeled as organic after June 9, 2007:
(a) For the first 9 months of the year, provide a minimum of 80 percent feed that is either organic or raised from land included in the organic system plan and managed in compliance with organic crop requirements; and (b) Provide feed in compliance with §205.237 for the final 3 months.

iii. Once an entire, distinct herd has been converted to organic production, all dairy animals shall be under organic management from the last third of gestation.

3. **Breeder stock:** Livestock used as breeder stock may be brought from a nonorganic operation onto an organic operation at any time: *Provided*, That, if such livestock are gestating and the offspring are to be raised as organic livestock, the breeder stock must be brought onto the facility no later than the last third of gestation.

b. The following are prohibited:

1. Livestock or edible livestock products that are removed from an organic operation and *subsequently* managed on a nonorganic operation may not be sold, labeled, or represented as organically produced.
2. Breeder or dairy stock that has not been under continuous organic management since the last third of gestation may not be sold, labeled, or represented as organic slaughter stock.
3. The producer *of* an organic livestock operation must maintain records sufficient to preserve the identity of all organically managed animals and edible and nonedible animal products produced on the operation.

[65 FR 80637, Dec. 21, 2000, as amended at 71 FR 32807, June 7, 2006]

205.237 Livestock feed

a. The producer of an organic livestock operation must provide livestock with a total feed ration composed of agricultural products, including pasture and forage, that are organically produced and, if applicable, organically handled: *Except*, That, nonsynthetic substances and synthetic substances allowed under §205.603 may be used as feed additives and supplements.

b. The producer of an organic operation must not:

1. Use animal drugs, including hormones, to promote growth;
2. Provide feed supplements or additives in amounts above those needed for adequate nutrition and health maintenance for the species at its specific stage of life;

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3. Feed plastic pellets for roughage;
4. Feed formulas containing urea or manure;
5. Feed mammalian or poultry slaughter by-products to mammals or poultry;
or
6. Use feed, feed additives, and feed supplements in violation of the Federal Food, Drug, and Cosmetic Act.

205.238 Livestock health care practice standard

- a. The producer must establish and maintain preventive livestock health care practices, including: Selection of species and types of livestock with regard to suitability for site-specific conditions and resistance to prevalent diseases and parasites;
 1. Provision of a feed ration sufficient to meet nutritional requirements, including vitamins, minerals, protein and/or amino acids, fatty acids, energy sources, and fiber (ruminants);
 2. Establishment of appropriate housing, pasture conditions, and sanitation practices to minimize the occurrence and spread of diseases and parasites;
 3. Provision of conditions which allow for exercise, freedom of movement, and reduction of stress appropriate to the species;
 4. Performance of physical alterations as needed to promote the animal's welfare and in a manner that minimizes pain and stress; and
 5. Administration of vaccines and other veterinary biologics.
- b. When preventive practices and veterinary biologics are inadequate to prevent sickness, a producer may administer synthetic medications: *Provided*, That, such medications are allowed under §205.603. Parasiticides allowed under §205.603 may be used on:
 1. Breeder stock, when used prior to the last third of gestation but not during lactation for progeny that are to be sold, labeled, or represented as organically produced; and
 2. Dairy stock, when used a minimum of 90 days prior to the production of milk or milk products that are to be sold, labeled, or represented as organic.
- c. The producer of an organic livestock operation must not:
 1. Sell, label, or represent as organic any animal or edible product derived from any animal treated with antibiotics, any substance that contains a

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synthetic substance not allowed under §205.603, or any substance that contains a nonsynthetic substance prohibited in §205.604.

2. Administer any animal drug, other than vaccinations, in the absence of illness;
3. Administer hormones for growth promotion;
4. Administer synthetic parasiticides on a routine basis;
5. Administer synthetic parasiticides to slaughter stock;
6. Administer animal drugs in violation of the Federal Food, Drug, and Cosmetic Act; or
7. Withhold medical treatment from a sick animal in an effort to preserve its organic status. All appropriate medications must be used to restore an animal to health when methods acceptable to organic production fail. Livestock treated with a prohibited substance must be clearly identified and shall not be sold, labeled, or represented as organically produced.

205.239 Livestock living conditions

- a. The producer of an organic livestock operation must establish and maintain livestock living conditions which accommodate the health and natural behavior of animals, including:
 1. Access to the outdoors, shade, shelter, exercise areas, fresh air, and direct sunlight suitable to the species, its stage of production, the climate, and the environment;
 2. Access to pasture for ruminants;
 3. Appropriate clean, dry bedding. If the bedding is typically consumed by the animal species, it must comply with the feed requirements of §205.237;
 4. Shelter designed to allow for:
 - i. Natural maintenance, comfort behaviors, and opportunity to exercise;
 - ii. Temperature level, ventilation, and air circulation suitable to the species; and
 - iii. Reduction of potential for livestock injury;
- b. The producer of an organic livestock operation may provide temporary confinement for an animal because of:
 1. Inclement weather;
 2. The animal's stage of production;

3. Conditions under which the health, safety, or well being of the animal could be jeopardized; or
 4. Risk to soil or water quality.
- c. The producer of an organic livestock operation must manage manure in a manner that does not contribute to contamination of crops, soil, or water by plant nutrients, heavy metals, or pathogenic organisms and optimizes recycling of nutrients.

Chinese Standards for Organic Livestock and Poultry Production

Among the Asian developing countries, China is one of the leading producer and exporter of organic agricultural products. It has developed its own standards for organic production. It is always important to appraise complete standards document for better understanding of the organic production guidelines as per the given standards, yet, due to space limitation, only the part of standards which deal with livestock and poultry production has been presented as under:

Livestock and Poultry Production

Conversion Period

1. Conversion period of the feedstuff production base is the same as that for organic farm. Conversion period may be reduced to 12 months for pasturages and grasslands for exercising area for non-herbivore animals. If the land concerned has never received treatments with prohibited materials, conversion period may be reduced to 6 months.
 - 1.1. Livestock and poultry products may be sold as organic products only after conversion period ends. Conversion periods for livestock and poultry are as follows:
 - a) 12 months in the case of equines, bovines and camels for meat production;
 - b) 6 months in the case of sheep and pigs for meat production;
 - c) 6 months in the case of livestock for milk production;
 - d) 10 weeks in the case of poultry for meat production;
 - e) 6 weeks in the case of poultry for egg production; and,
 - f) Longer than three quarters of their breeding periods in the case of other animals.

1.2. Parallel production

If a livestock or poultry farm raises one single breed or breeds of livestock or poultry that are hard to distinguish at the same time, which are fed both organically and non-organically, livestock and poultry with organic operation may be sold as organic products, provided that:

- a) Pens, free-range and exercise areas as well as pasturages for organically reared livestock and poultry are completely separated from those for non-organically reared livestock and poultry. Or the organically reared livestock and poultry are easily distinguished from those non-organic raised ones;
- b) Warehouse or area for storing feed shall be separated with obvious marks or labels;
- c) Detailed records of separating, feeding and medical treatment both for organic and non-organic;
- e) livestock and poultry shall be well kept; and,
- d) Organically reared livestock and poultry shall not stay in contact with storage areas for non-organic feed and prohibited materials.

1.3. Origin of livestock and poultry

1.3.1. Organically reared livestock and poultry shall be introduced. When organically reared livestock and poultry are not available, conventionally reared livestock and poultry may be allowed to be introduced, provided that:

- a) Equines, bovines and camels for meat production have been weaned, and in any case they must be less than 6 months old;
- b) Piglets and lambs have been weaned, and in any case they must be less than 6 months old;
- c) Bovines for milk production shall be less than 4 weeks old and are fed with colostrums and mainly on whole milk;
- d) Chickens for meat production shall be less than 3 days old (For other poultry, up to 2 weeks old may be allowed); and,
- e) Pullets for egg production shall be less than 18 weeks old.

1.3.2. Maximum of 10% of conventionally reared livestock for breeding may be introduced. The percentage may be increased up to 40%

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following the agreement of the certification body, in the following special cases:

- a) When some serious, unpredictable natural disasters or accidents occur;
- b) When a major extension of the livestock farm is made; and,
- c) When a new livestock breeding is developed.

Conventionally reared livestock and poultry introduced shall go through the corresponding conversion period.

- 1.3.3. Males for breeding may be introduced from non-organic stock farms providing that the animals are subsequently reared and fed organically.
- 1.3.4. All livestock and poultry introduced shall not be polluted by GMOs and products derived there from, including breeding materials, vaccines, veterinary medicinal products, feeds and feed additives.

1.4. Feeds

- 1.4.1. Livestock and poultry shall be fed on organically produced feedstuff. At least 50% of the feed shall be obtained from the feed base of the same farm or from other organic farms with co-operating relationship with the farm in the same region. Production of the feeds shall comply with the requirements for crop production set out in Section 4 of this part.
- 1.4.2. In the first year when organic management is implemented in the livestock or poultry farm, feeds produced on the same farm in accordance with this Standard may be fed as organic feeds to the livestock and poultry on the farm, but they shall not be sold as organic feeds.
- 1.4.3. When organic feedstuff is in short supply, conventional feedstuff is allowed to be purchased. However, the maximum percentage of conventional feedstuff out of the total consumption per year shall not exceed the following percentages:
 - a) 10% (by dry matter) for herbivores; and
 - b) 15% (by dry matter) for non-herbivore species.

The ratio of conventional feedstuff shall not exceed 25% of the total daily ration. When unpredictable catastrophes or accidents happen, a higher percentage of conventional feeds may be allowed for a limited period of time. Permission shall be obtained from

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the certification body before the use of conventional feed and the operation shall be recorded in details.

1.4.4. Ruminants shall be guaranteed with roughage to satisfy their daily nutritional demand. The percentage of roughage, fresh fodder or silage shall not be less than 60% in daily rations (which can be reduced to 50% within the first three months, in the case of livestock for milk production). Roughage, fresh or dried fodder, or silage must be added to the daily ration for pigs and poultry.

1.4.5. Young mammals shall stay with their mothers and shall be fed on adequate colostrums. In the lactation period, young mammals may be allowed to be fed on organic milk of the same kind. When organic milk is not available, non-organic milk of the same kind may be allowed.

Early weaning or feeding young animals with milk substitute is prohibited. Under some emergency, milk substitutes may be allowed to supplement feed materials, whereas the substitutes shall not contain antibiotics, synthetic chemical additives or substances derived from slaughtered animals. The lactation period shall be at least:

- a) 6 weeks for pigs and sheep/goats; and,
- b) 3 months for equines and bovines.

1.4.6. The main feed ingredients from agricultural origin in compound feeds shall be organically certified.

1.4.7. GMOs and products derived therefrom shall not be used in the production of feedstuffs, feed ingredients and feed additives.

1.4.8. The following methods and products are prohibited:

- a) Feeding ruminants with animals and products derived therefrom, or feeding livestock and poultry with the animals of the same breed or products derived therefrom;
- b) Animal excrements no matter if being processed or not; and,
- c) Feedstuff extracted by chemical solvent or mixed with synthetic chemical materials.

1.5. Feed additives

1.5.1. Feed additives shall be from the list of feed additives published by Ministry of Agriculture, and subject to the requirements set out in other parts of this Standard.

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- 1.5.2. Natural minerals and trace elements may be used, such as magnesia, greensand, among others.
- 1.5.3. Added vitamins shall be derived from grain sprouting, cod liver oil, vintage yeast or other natural materials.
- 1.5.4. Following products are prohibited:
 - a) Synthetic chemical growth promoters (including antibiotics, hormones and trace elements for the purpose of growth promotion);
 - b) Synthetic chemical appetizers;
 - c) Preservatives (except when used as processing aids);
 - d) Synthetic chemical pigments;
 - e) Non-protein nitrogen (e.g. urea);
 - f) Chemically extracted amino acid; and,
 - g) GMOs or products derived therefrom.

1.6. Husbandry conditions

- 1.6.1. Conditions for livestock and poultry husbandry (stock, pens etc.) shall meet the livestock's biological and ethological needs and satisfy the following conditions including:
 - a) Adequate movement in space and time; Open-air runs for livestock and poultry may be partly covered;
 - b) Good ventilation and abundant sunshine, while excessive sunshine shall be avoided;
 - c) Appropriate temperature, humidity, and avoiding attacks by winds, rain and snow;
 - d) Ample bedding strewn with litter materials;
 - e) Abundant drinking water and feed; and,
 - f) Construction materials and facilities that are obviously harmful to people as well as livestock and poultry are prohibited.
- 1.6.2. Drinking water quality for livestock and poultry shall comply with the requirements set out in Annex C.
- 1.6.3. In the case of laying hens raising natural light may be supplemented by artificial means to provide a maximum of 16 hours light per day.

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- 1.6.4. Livestock and poultry shall have access to outdoors in appropriate seasons, with the exception of the following special cases:
 - a) When the special structures of the livestock houses temporarily restrict the livestock and poultry from access to the outdoors, but shall be improved within limited period of time; and,
 - b) Enclosing is more efficient than grazing for the sustainable utilization of land resources.
- 1.6.5. Animal husbandry measures restricting livestock and poultry access to land are prohibited. Complete enclosing, keeping inside houses and keeping livestock tethered are also prohibited.
- 1.6.6. Social livestock and poultry shall not be kept in single house with the exception for sick livestock and poultry, adult males and livestock at its later stage of pregnancy.
- 1.6.7. Necessary protection measures shall be taken to protect livestock and poultry from attacks by wild predators.
- 1.6.8. Feeding livestock and poultry by force is prohibited.
- 1.7. Disease prevention and veterinary treatment**
 - 1.7.1. Disease prevention for organically reared livestock and poultry shall be in compliance with the following principles:
 - a) Selection of breeds with high adaptability and strong disease resistance considering local conditions;
 - b) On the basis of need of the livestock, such measures as rotational grazing, use of high quality feed and appropriate exercises shall be adopted to strengthen the non-specific immunological defense of the animal; and,
 - c) Ensuring an appropriate density of livestock, thus avoiding any animal health problems resulting from overstocking.
 - 1.7.2. Disinfectors listed in Annex C may be used in animal husbandry. Government authorized raticides and materials listed in Annex B may be used in animal husbandry in absolutely safe manner.
 - 1.7.3. When disinfection is conducted, livestock and poultry shall be moved out of the areas. Excrements of livestock and poultry shall be periodically cleaned and disposed of.
 - 1.7.4. Natural therapies may be allowed to treat livestock and poultry sicknesses, such as Chinese veterinarians, acupuncture, herbal medicines and homeopathic medicinal measures.

- 1.7.5. Compulsory preventive vaccination authorized by the governments is allowed. When a farm is in danger of some disease, which can not be possibly controlled by other means, urgent preventive vaccination may be allowed (including the vaccination to promote the production of antibody in maternal animals). However, the vaccines shall not be genetically modified. Use of antibiotics and chemically synthesized medicines for preventive treatment is prohibited for livestock and poultry.
- 1.7.6. When preventive measures taken can not control the disease and suffering of the animal, conventional veterinary medicinal products may be allowed to use under the instruction of a veterinarian, whereas these livestock and products derived therefrom may be sold as organic only after withdrawal period has been doubled (in case the doubled withdrawal period is less than 48 hours, the required period shall still be extended to 48 hours).
- 1.7.7. Use of substances to promote growth or production, including antibiotics, coccidiostats and other artificial aids for growth promotion purposes, and the use of hormones or similar substances to control reproduction (e.g. induction or synchronisation of oestrus, excessive ovulation) are prohibited. Nevertheless, hormones may be administered to an individual animal, as a form of therapeutic veterinary treatment.
- 1.7.8. With the exception of vaccinations required by government regulations, an animal or a group of animals, if their productive lifecycle is less than one year, may be allowed to receive only one course of treatment with allopathic veterinary medicinal products; for those with a productive lifecycle longer than one year, the maximum allowed courses of treatment is three for a year; otherwise, the livestock concerned, or products derived from them shall not be sold as organic. And the livestock and poultry shall be subject to the agreement of the certification body and undergo the required conversion period if they still stay in the organic production system.
- 1.7.9. Details of the diagnosis, the posology, the method of administration, the time and duration of the treatment and the legal withdrawal period must be recorded clearly. Livestock and poultry treated must be clearly identified, individually in the case of large animals; or by batch, in the case of poultry and small animals.

1.8. Non-therapeutic operations

1.8.1. Organic production shall place emphasis on animals' individual characteristics. Breeds which do not need non-therapeutic operations shall be selected to the maximum possible level. On the premise of minimizing pains of livestock and poultry, following non-therapeutic operations may be allowed, with injection of anesthetics if necessary:

- a) Physical castration (meat-type pigs, bullocks, capons, etc);
- b) Dehorning;
- c) Passivating piglets' milk teeth within 24 hours after birth to prevent them from hurting the breasts of maternal pigs;
- d) Tail-docking for lambs;
- e) Cutting feather; and,
- f) Looping.

1.8.2. The following non-therapeutic operations are prohibited:

- a) Tail-docking (except for lambs);
- b) Trimming of beaks and toes;
- c) Ironing wings;
- d) Cutting piglets' teeth; and,
- e) Other non-therapeutic operations which are not allowed definitely.

1.9. Reproduction

1.9.1. Reproduction should be based on natural methods.

1.9.2. Reproduction measures may be allowed, which will not produce serious influences on the genetic diversity of livestock and poultry, for instance, artificial insemination.

1.9.3. Other forms of artificial or assisted reproduction, which may seriously affect the genetic diversity of livestock and poultry, such as embryo transfer and cloning, are prohibited.

1.9.4. Except for the purpose of treatment, use of hormones is prohibited to stimulate livestock and poultry to ovulate or give birth.

1.9.5. Offspring shall not be certified as organic products if the maternal livestock receive treatments with prohibited materials within the last one third of the period of pregnancy.

1.10. Transport and slaughter

- 1.10.1. Livestock and poultry shall be clearly marked so as to be identified at all stages of their loading and unloading, transportation, prior to and during slaughtering.
- 1.10.2. Livestock and poultry shall be managed by specific persons at all stages of their loading and unloading, transport and prior to slaughtering.
- 1.10.3. Livestock and poultry shall be provided with appropriate conditions, for example:
 - a) Livestock and poultry shall be prevented from being in contact with animals in slaughter or dead animals by means of seeing, hearing and smelling;
 - b) Contacts among existing communities shall be maintained and the mixture of livestock and poultry from different communities or genders shall be avoided;
 - c) Livestock and poultry shall be provided with time to relieve stresses;
 - d) Quality and suitability of transportation means and handling facilities shall be ensured. Transportation vehicles shall be appropriate for the transported livestock and poultry;
 - e) Hunger and thirst in the process of transportation shall be avoided. If needed, water and food shall be provided to livestock and poultry;
 - f) Individual demands from livestock and poultry shall be considered and satisfied as far as possible;
 - g) Appropriate temperature and relative humidity shall be maintained; and,
 - h) Stresses to livestock and poultry shall be minimized during their loading and unloading.
- 1.10.4. Practices of transporting and slaughtering shall be peaceful as far as possible. Electronic probes and similar devices are prohibited to coerce animals. Use of allopathic tranquillizers or exhilarants are prohibited prior to or during transport.
- 1.10.5. Generally, the time of transporting livestock and poultry by vehicles shall not exceed 8 hours unless the production area is far away from the slaughterhouse. Slaughter shall often be carried out at the nearest slaughterhouse.

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- 1.10.6. Banding, suspending and slaughtering livestock and poultry before they lose consciousness shall be prohibited. The tools for depriving livestock of consciousness prior to slaughter shall be in good working state at any moment. Nevertheless, in case of making livestock and poultry lose consciousness prior to slaughter is forbidden for religious or cultural reasons, then they can be slaughtered directly and the practices of slaughter shall be carried out in a peaceful environment and within the shortest time possible.
- 1.10.7. Organically reared livestock and poultry shall be separated from conventionally reared ones during slaughtering. Derived products shall be separated during storage and be clearly marked. The inks for marks on livestock shall be subject to the government regulations on food hygiene.

1.11. Impacts on the environment

- 1.11.1. The number of livestock and poultry living in the area shall not exceed the maximum capacity of animal husbandry with full consideration of capacity of feed production, health of livestock and poultry as well as the impacts on the environment. If the environment suffers from impacts caused by overgrazing, products concerned shall not be certified as organic.
- 1.11.2. Storage facilities shall have adequate space to store wastes of livestock and poultry, and these wastes shall be disposed of in a timely manner and utilized properly. The design and handling of facilities to store and dispose of wastes shall avoid polluting both groundwater and surface water. The discharge of pollutants from animal production base shall satisfy the requirements set out in GB18596.

The East African Organic Products Standard (EAOS)

Organic farming is being actively promoted by among others the United Nation's bodies, which are offering support in development of regional standards for organic production. The East African Organic Products Standard (EAOS) is one good example of such efforts. The standard was developed by a public-private sector partnership in East Africa, supported by the UNEP-UNCTAD Capacity Building Task Force on Trade, Environment and Development (CBTF), a joint initiative of the United Nations Conference on Trade and Development (UNCTAD) and the United Nations Environment Programme (UNEP), and the International Federation of Organic Agriculture Movements (IFOAM).

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The EAOS launched on May 2007 is the second regional organic standard in the world, following that developed by the European Union. The EAOS and associated East African Organic Mark is meant to ensure consumers that produce so labelled has been grown in accordance with a standardized method based on traditional methods supplemented by scientific knowledge, and based on ecosystem management rather than the use of artificial fertilizers and pesticides. As organic produce generally sells at premium prices in rapidly growing overseas markets, it is expected that the organic label and standard will increase sales and boost profits for small farmers and expand exports and domestic and regional sales in the region. An appraisal of this standard may be useful for the stakeholders in the developing countries in particular since in these standards the socio-economic and small holder nature of farmers has been well taken care of, while developing the standards in a participatory manner.

The parts of the standard which deal with animal husbandry has been reproduced hereunder:

1.1. Conversion and brought-in animals

1.1.1. The animal husbandry and individual animals brought into a herd shall undergo a conversion period according to the following:

Type of production	Species	Length of conversion period
Meat production	cows	12 months
	poultry	45 days
	sheep, goats, pigs	3 months
	rabbits	45 days
Dairy production	all species	3 months
Eggs	all species	45 days

1.1.2. Animals shall be raised organically from birth. Where organic livestock is not available, conventional animals may be brought in, according to the following maximum age limits:

- 2-day-old chicks for meat production;
- 18-week-old hens for egg production;
- 2 weeks old for any other poultry;
- 3 months old for piglets;
- 3 months old for calves;

- 3 months for goats and sheep.

Older animals may be brought in for breeding only.

1.2. Parallel production

Products from the same type of animal and the same type of production which are both organic and non-organic (conventional or in-conversion) on the same farm shall not be sold as organic unless the production is done in a way that allows for the clear and continuous separation of the organic and non-organic productions.

1.3. Animal management

- 1.3.1. Animals shall be kept in accordance with good animal-husbandry practices.

Animals shall have access to sufficient fresh air, water and feed. Animals shall have access to protection from direct sunlight, excessive noise, heat, rain, mud and wind to reduce stress and ensure their well-being. Animals shall not be mistreated or beaten.

- 1.3.2. Animals shall have the living conditions and be managed according to their natural behavioural needs. For example:

- Pigs shall be provided with material to root.
- Goats shall have the possibility of climbing.
- Chickens shall have the possibility of scratching and of taking regular dust baths.

Animals shall have the living conditions and be managed in a way that prevents abnormal behaviour, injury and disease.

- 1.3.3. Animals shall have sufficient space for free movement, according to their natural behaviour.

- 1.3.4. Housing conditions shall ensure sufficient lying and resting areas that correspond to the natural needs of the animals. Animals shall have a dry resting area whenever possible. They shall also be provided with natural bedding where appropriate.

- 1.3.5. Pens and holding areas shall be cleaned regularly.

- 1.3.6. Tethering may be practised, provided it does not affect the well-being of the animal. The animal shall have access to adequate feed, shade and water. The method of tethering shall enable the animal to freely move within the grazing area without getting entangled or choked. The tethering shall not cause wounds or otherwise physically harm animals.

- 1.3.7. Animals shall have the opportunity to feed according to their natural behaviour, e.g. grazing. However, where the bringing of fodder is a more sustainable way to use land resources than grazing, animals may be fed with brought fodder, provided that the animals have access to an outdoor run on a regular basis.
- 1.3.8. Grazing management shall not degrade soil, pasture and water resources.

1.4. Breeding

- 1.4.1. Artificial insemination may be practised.
- 1.4.2. Embryo-transfer techniques and cloning shall not be used.

1.5. Mutilations

Mutilations may not be practised, except in the following cases:

- castration
- ringing
- dehorning (only of young animals)

Mutilations shall be done in such a way that the suffering of the animal is minimised. Anaesthetics shall be used where appropriate.

1.6. Animal feeds

- 1.6.1. Animals shall be fed 100 % organic feedstuff. Where the quantity or quality of commercially available organic feed is inadequate, the daily maximum percentage of non-organic feed shall be 40%, calculated on a dry-matter basis.
- 1.6.2. All animals shall have access to fresh fodder. Ruminants shall get fresh fodder daily through grazing or feeding. Where such fodder is not available, preserved fodder may be used.
- 1.6.3. To ensure a connection between plant production and animal husbandry, at least 60 % of feed shall come from the farm itself or be produced in cooperation with other organic farms.
- 1.6.4. The following products shall not be included in the feed:
- meat, bone and other abattoir waste products to ruminants
 - chicken manure or other animal manure to ruminants
 - Feeds subjected to solvent extraction (e.g. hexane) or the addition of other chemical agents
 - amino-acid isolates

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- urea and other synthetic nitrogen compounds
- synthetic growth promoters or stimulants
- antibiotics
- synthetic appetizers
- artificial colouring agents
- genetically engineered organisms or products thereof

1.6.5. Feed preservatives may not be used except for

- plant-based products,
- by-products from the food industry (e.g. molasses),
- bacteria, fungi and enzymes,

1.6.6. Animals may be fed vitamins, trace elements and supplements from natural sources. Synthetic vitamins, minerals and supplements may be used where natural sources are lacking in quantity or quality.

1.6.7. Young stock from mammals shall be raised on maternal milk or organic whole milk from their own species. Young animals shall be allowed to suckle. Where organic whole milk is not available, conventional whole milk shall be used. Milk replacements may be used only in emergencies and shall not contain ingredients mentioned in 6.6.4.

Animals shall be weaned only after a minimum time that takes into account the natural behaviour and physical needs of the animal.

1.7. Parasite and disease management

1.7.1. Disease prevention in organic livestock production shall be based on the following:

- the choice of appropriate breeds or strains of animals;
- the application of animal-husbandry practices appropriate to each species, encouraging strong resistance to disease and the prevention of infections;
- the use of good quality organic feed, regular exercise, and access to pasture or runs in the open air;
- an appropriate density of livestock.

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- 1.7.2. If an animal becomes sick or injured despite preventative measures, it shall be treated promptly and adequately. As a first option, phytotherapeutic and other alternative treatments shall be used where they are proven to be effective in curing sickness or healing an injury. An operator may use synthetic veterinary drugs, antibiotics or synthetic pesticides only if preventive and alternative practices are unlikely to be effective in curing sickness or healing an injury.

The operator shall not withhold medication from sick or injured animals, even if the use of such medication would cause the animal to lose its organic status.

- 1.7.3. Treatments with synthetic pesticides or veterinary drugs against parasites shall be based on knowledge of the parasites and the chemical treatment used. All treatments with synthetic pesticides or veterinary drugs against parasites shall be documented.
- 1.7.4. Withholding periods after treating animals with synthetic veterinary drugs, antibiotics or synthetic pesticides shall not be less than double the period required by legislation or a minimum of 48 hours, whichever is longer.
- 1.7.5. Vaccinations may only be used when:
- an endemic disease is known or is expected to be a problem in the region of the farm; and where this disease cannot be controlled by other management techniques; or
 - vaccination is legally required.
- 1.7.6. Hormonal treatment may be used only for therapeutic reasons and under veterinary supervision.
- 1.7.7. Synthetic growth promoters or substances used for the purpose of stimulating production shall not be used.

1.8. Transport and slaughter

Handling, including transport and slaughter, shall be carried out calmly and gently and involve the minimum of physical and mental strain or stress for the animal. The animals shall be provided with conditions that minimise stress and other adverse effects of

- hunger and thirst,
 - extreme temperatures or relative humidity,
 - mixing different groups, sexes, age, and health status.
- National Standards for Organic Livestock Production in India

Pacific Organic Standard

The Pacific Organic Standard was developed under a project financed by the International Fund for Agricultural Development (IFAD) and implemented by the International Federation of Organic Agriculture Movements (IFOAM) in cooperation with the Secretariat of the Pacific Community (SPC) and the Regional Organic Task Force (Boor 2008). The Pacific Organic Standard is the third regional organic standard produced worldwide, after the EU regulation 2092/91 and the East African Organic Products Standard. The provisions of the Standard take into account both local agricultural traditions and the two global organic standards, IFOAM IBS and Codex Alimentarius. Thus, Pacific stakeholders have true ownership of their regional standard, while at the same time; it is consistent with existing international standards. IFOAM encourages the development of organic standards that are adapted to local cultures and ecosystems and that reflect the organic vision and needs of their future users. Yet IFOAM recognises that the multiplicity of private and public organic standards and technical regulations governing organic production and certification have placed a burden on producers and created barriers to trade on many levels. This is why IFOAM promotes harmonisation of organic standards at the international level, but also views geographical regions as a particularly appropriate level for adopting public standards and regulations.

The Pacific Organic Standard is expected to serve as a basis for raising the profile of organic agriculture among farmers and consumers, strengthening organic production capacity in the region, and promoting further development of local, regional and international markets for Pacific organic agriculture products. This 66 page document (Secretariat of the Pacific Community 2008) covers many areas of organic crop, animal, bee and aquaculture production, processing, handling, labeling and social justice etc. We have chosen to partially reproduce below the section on animal management to show how standards could vary considering the local conditions, traditions and culture, while being consistent with the international standards in order to facilitate trade of organic agricultural products across the world.

1.1 Animal Management

Outline and general principle

Pacific farmers have long raised pigs and chickens, while other animals are also important in some regions. Animals are an essential component of the mixed farming systems found throughout the region. They have cultural value, and also contribute to food security and soil fertility. A wider range of animals are now being farmed in the Pacific and this standard has been designed to incorporate the best approaches from traditional experience and organic principles. The adoption of this standard

will ensure that livestock husbandry is based on maintaining a harmonious relationship between land, plants and livestock, with minimum disruption to ecosystems. It will also ensure that the physiological and behavioural needs of livestock are respected and the animals are fed good-quality organically grown feedstuffs.

Scope

This livestock standard covers livestock and livestock products from the following: cows and cattle; pigs; sheep and goats; deer; poultry; crocodiles; and bees.

Standard

- 1.1.1 Operators shall practise methods of animal management that reduce stress, promote animal health and welfare, prevent disease and parasitism, and avoid the use of chemical allopathic veterinary drugs.
- 1.1.2 Animals shall be kept in accordance with good animal husbandry practices, with access to sufficient fresh air and enough clean water and nutritious feed to satisfy their needs. Animals shall have access to protection from sunlight, excessive noise, heat, rain, mud and wind to reduce stress and ensure their well-being.
- 1.1.3 If animals are housed they shall have:
- sufficient space to stand naturally, lie down easily, turn around, groom themselves and assume all natural postures and movements, such as stretching or wing flapping;
 - adequate fresh, natural bedding materials for animals that require bedding, and pens that are kept clean;
 - enclosures that are constructed so as to ensure adequate insulation, heating, cooling and ventilation, and that enable dust levels, temperature, relative humidity and gas concentrations to be kept within levels that are not harmful to livestock;
 - capacity to maintain social structures, e.g. by ensuring that herd animals are not kept in isolation from other animals of the same species;
 - enclosures, and any associated production equipment, that are constructed of materials that do not harm human or animal health.
- 1.1.4 Poultry, rabbits and pigs shall not be kept in cages.

- 1.1.5 Landless animal husbandry systems are prohibited and all animals shall have access to pasture or an open-air exercise area or run, whenever the physiological condition of the animal, the weather and the state of the ground permit. Animals may be fed with harvested fresh fodder where this is a more sustainable way to use land resources than grazing.
- 1.1.6 The number of animals carried in an area and the flock/herd size must be limited to enable them to freely exhibit their natural behavior and to ensure that there is no damage to soil and water resources.
- For pigs – housing areas for pigs over 40 kg shall be a minimum area of 1.1 m² per animal, for breeding pigs 3.0 m² per animal, and for piglets 0.6 m². For poultry – the housing area for poultry older than 28 days shall be larger than 0.1 m² per bird. The stocking density of livestock kept on pasture, grassland, or other natural or semi-natural habitats, must be low enough to prevent degradation of the soil and over-grazing of vegetation.
- 1.1.7 Animals must be well treated and free from pain, injury or disease. Animals shall be inspected regularly and any apparent ill-health or injury shall be quickly treated. Animals shall be protected from predation by wild, feral and domestic animals such as dogs. Tethering may be practised, provided that it does not affect the well-being of the animal and sufficient food and water are available. The method of tethering shall enable the animal to move freely within the grazing area without getting entangled or choked. The tethering shall not cause wounds or other physical harm to animals.
- 1.1.8 Waterways and water catchment areas shall be protected from damage by animals, e.g. pig rooting and pollution from animal effluent and associated waste.
- 1.1.9 In the case of laying hens, when natural day length is prolonged by artificial light, the total length of the lighted period shall be no more than 16 hours a day.

1.2 Length of Conversion Period

Outline and general principle

The establishment of organic animal husbandry requires an interim period, the conversion period, unless the requirements, as set out in 3.1.1, are

complied with for traditional systems. Animal husbandry systems that are changed from conventional to organic production require a conversion period to develop natural behaviour, immunity and metabolic functions.

Standard

- 1.2.1 Livestock and their products can hold no greater status (whether in conversion or organic) than is currently held by the production unit itself. Where a production unit is converted, the rules as outlined in 3.1 and 4.2 must be complied with.
- 1.2.2 Where existing animals are converted to organic status on an organic property they shall undergo a one-time minimum conversion period according to the following schedule:
- For animals for milk production – 90 days
 - For poultry for egg production – 42 days

Note that except for the above situation, only conventionally raised animals, as specified in 5.3.1, can be brought in and that any other livestock cannot be converted to organic status even after the above conversion periods.

1.3 Source or Origin of Animals

Standard

- 1.3.1 Animals shall be raised organically from birth. However, if such animals are not available, conventional animals may be brought in before they reach the following maximum ages:
- 2-day-old chickens for meat production;
 - 18-week-old hens for egg production;
 - 2 weeks for any other poultry;
 - Piglets up to 6 weeks and after weaning;
 - Dairy calves, deer, sheep and goats – animals up to 4 weeks old that have received colostrum and have been fed a diet consisting mainly of full milk.

Livestock that do not comply with the above conditions can never be converted to organic status.

5.3.2 Breeding stock may be brought in from conventional farms only to a yearly maximum of 10% unless the following occur:

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- Unforeseen severe natural or man-made events, e.g. droughts, cyclones;
- Considerable enlargement of the farm;
- Establishment of a new type of animal production on the farm;
- Holdings have less than 10 animals.

Animals brought in from non-organic sources, and their products, may be converted to organic status only within the minimum time frames set out in 5.3.1.

1.4 Breeds and Breeding

Outline and general principle

Pacific livestock farmers traditionally selected livestock that were adapted to local conditions and management systems. This resulted in a great diversity of breeds, e.g. pig breeds, and aligns well with organic livestock breeding principles.

Standard

- 1.4.1 Breeding systems shall be based on breeds that can breed naturally without human involvement.
- 1.4.2 Artificial insemination is permitted.
- 1.4.3 Embryo transfer techniques and cloning are prohibited.
- 1.4.4 The use of hormones to induce ovulation and birth is prohibited.

1.5 Surgical Treatments

Outline and general principle

Traditionally, livestock were treated with great care because of their relative rarity, and cultural and intrinsic values. This aligns well with organic farming principles, which respect the welfare of animals and encourage the selection of species and breeds that do not require any sort of mutilation.

Standard

- 1.5.1 The use of routine surgical treatment for animals is prohibited and may only be used for reasons of safety, to ease suffering, and to sustain the health and welfare of the animal. In such situations, the following treatments are permitted:

- Branding, earmarking or tagging
- Putting rings in pigs' noses
- Castration
- De-horning and de-tusking (only of young animals less than 6-months old)

1.6 Animal Nutrition

Outline and general principle

Under traditional management, livestock were tightly integrated into the overall farm management system. They obtained a balanced diet of good quality feed from the farm, which was sometimes supplemented with feed from associated activities, e.g. fishing. These practices align well with organic principles for animal nutrition in that organic animals should be fed a balanced diet of good quality organic feed that meets all their nutritional needs.

Standard

- 1.6.1 Animals shall be fed a balanced diet that provides all of their nutritional needs, with all ruminants having daily access to roughage. Feed is to be made up of 100% organic feedstuffs. Where organic feed of sufficient quantity or quality is not available, the daily maximum percentage of non-organic feed shall be 10% for ruminants and 15% for non-ruminants based on annual dry matter consumed.
- 1.6.2 Over 50% of feed shall come from the farm itself or be produced in co-operation with other organic farms. The use of appropriate byproducts from the organic food processing industry is encouraged.
- 1.6.3 For the calculation of feeding allowances only, feed produced on the farm unit during the first year of organic management may be classed as organic. This refers only to feed for animals that are being produced within the farm unit. Such feed may not be sold or otherwise marketed as organic.
- 5.6.4 The following substances are prohibited from use as feed:
- For ruminants, farm animal by-products (e.g. abattoir waste);
 - Slaughter products of the same species;
 - All types of excrement, including droppings or other manure;

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- Feed subjected to solvent extraction (e.g. hexane) or the addition of other chemical agents;
- Synthetic amino acids and amino-acid isolates;
- Urea and other synthetic nitrogen compounds;
- Synthetic growth promoters or stimulants;
- Synthetic appetisers;
- Preservatives, except when used as a processing aid;
- Artificial colouring agents.

1.6.5 Animals may be fed vitamins, trace elements and supplements from natural sources. Synthetic vitamins, minerals and supplements may be used where natural sources are of insufficient quantity or quality; this use will be assessed on a case by case basis.

1.6.6 Only the following feed preservatives can be used:

- a. Bacteria, fungi and enzymes (including effective microorganisms);
- b. Food industry by-products (e.g. molasses);
- c. Plant-based products.

1.6.7 Young mammalian livestock shall receive colostrum for a minimum of 3 days after birth. They shall receive organic natural milk from their own species until they reach the weight at which they should normally be weaned from their mothers. Exceptions can be made in emergency cases only, and only in agreement with the certifier.

1.7 Disease Prevention and Veterinary Medicine

Outline and general principle

Under traditional management, a wide range of preventive strategies were developed by Pacific farmers to protect the health of their animals. This included the use of herbs such as ‘mile a minute’ (*Mikania micrantha*), vaivai (*Leucaena leucocephala*), lupus and papaya to treat disorders such as internal parasites, birthing difficulties and other ailments. Many of these practices align well with organic management practices, which promote and maintain the health and well-being of animals through balanced organic nutrition, stress-free living conditions and selection of breeds resistant to diseases, parasites and infections.

Standard

- 1.7.1 The operator shall take all practical measures to ensure the health and well-being of animals through using preventive animal husbandry practices. These include:
- selection of appropriate breeds or strains of animals;
 - adoption of husbandry practices appropriate to the requirements of each species, such as regular exercise and access to pasture and/or open-air runs, to encourage the natural immunological defences of the animal to stimulate natural immunity and tolerance to diseases;
 - provision of good quality organic feed;
 - appropriate stocking densities;
 - grazing rotation and management.
- 1.7.2 If an animal becomes sick or injured despite preventive measures, it shall be treated promptly. The initial use of natural, herbal or homeopathic products or practices is recommended in preference to the use of chemically synthesised veterinary products. Producers shall not withhold medication where it will result in unnecessary suffering for livestock, even if the use of such medication will cause the animal to lose its organic status. An operator may use synthetic veterinary drugs or antibiotics only if:
- a. preventive and alternative practices are unlikely to be effective in treating sickness or injury;
 - b. the drugs are used under the supervision of a veterinarian or other suitably qualified supervisor; and
 - c. withholding periods are not less than double those required by national legislation or where this is not available – as established by other neighbouring countries legislation, e.g. Australia, New Zealand, or a minimum of 48 hours, whichever is longer.
- All treatments with synthetic veterinary drugs shall be documented.
- 1.7.3 The use of synthetic growth promotants or suppressants is prohibited.
- 1.7.4 Vaccinations are permitted in cases when:

- an endemic disease is known, or expected, to be a problem in the region of the farm and where this disease cannot be controlled by other management techniques; or
- a vaccination is legally required; and
- the vaccine is not genetically engineered.

1.8 Transport and Slaughter

Outline and general principle

In the Pacific, under traditional management, the slaughter of livestock was typically undertaken by the farmer as the need arose or sometimes as part of a cultural event. Animals were typically not transported far for this process for which a range of techniques were used. This standard recognises the traditional norms and aligns these with the organic principle that animals are subjected to minimum stress during transport and slaughter. The latter should include consideration of the specific needs of each animal and the quality and suitability of the mode of transport and handling equipment.

Standard

- 1.8.1 Animals shall be handled calmly and gently during transport and slaughter. The transport and slaughter of animals shall comply with all relevant national and regional regulations.
- 1.8.2 During the process of transportation and slaughter, organic animals shall be provided with conditions that reduce, and minimise the potentially adverse effects of:
 - stress;
 - loading and unloading;
 - mixing different groups of animals or animals of different sex;
 - temperature and relative humidity; and
 - hunger and thirst.
- 1.8.3 Animals shall not be treated with synthetic tranquilisers or stimulants prior to, or during transport. The use of electric prods and other such instruments is prohibited.
- 1.8.4 Slaughter shall be carried out quickly and without causing undue stress to the animal. Each animal shall be stunned before being

bled to death. Slaughter by bleeding, without stunning, is not permitted unless it is done to meet cultural or religious requirements and the practice is carried out in an appropriate and calm environment.

1.8.5 Each animal or group of animals shall be identifiable at each step in the transport and slaughter process.

1.8.6 Slaughterhouse journey times shall not exceed eight hours. Exceptions to this requirement include cases where:

- there is no certified organic abattoir within eight hours drive;
- there is no abattoir capable of satisfying national or importing country requirements within eight hours drive.

National Standards for Organic Livestock Production in India

(GOI, 2002)



I. Landscape

General Principles

Organic farming should contribute beneficially to the ecosystem.

Recommendations

Areas which should be managed properly and linked to facilitate biodiversity

- Extensive grassland such as moorlands, reed land or dryland.
- In general, all areas which are not under rotation and are not heavily manured.
- Extensive pasture, meadows, extensive grassland, extensive orchards, hedges, hedgerows, groups of trees and or bushes and forest lines
- Ecologically rich farrow land, arable land.
- Ecologically diversified (extensive) field margins
- Waterways, pools, springs, ditches, wetlands and swamps and other water rich areas which are not used for intensive agriculture or aqua production.
- Areas with ruderal flora

The certification programme shall set standards for a minimum percentage of the farm area to facilitate biodiversity and nature conservation.

Duration of Conversion Period

Conversion Period: The establishment of an organic management system and building of soil fertility requires an interim period, the conversion period. The conversion period may not always be of sufficient duration to improve soil fertility and reestablish the balance of ecosystem but it is the period in which all the actions required to reach these goals are started. The duration of the conversion period must be adapted to the past use of land and the ecological situation.

Standards

1. Plant products produced annually can be certified as organic when the national standards requirements have been met for a minimum of 12 months before the start of the production cycle. Perennial plants (excluding pastures and meadows) can be certified organic at the first harvest after at least 18 months of management according to the national standards requirements. Pastures, meadows and their products can be certified after 12 months of organic management.
2. The conversion period can be extended by the certification programme depending on past use of the land and environmental conditions.
3. The certification programme may allow plant products to be sold as “Produce of organic agriculture in the process of conversion” or a similar description, when the national standards requirements have been met for at least 12 months.
4. For the calculation of inputs for feeding, the feed produced on the farm unit during the first year of organic management, may be classed as organic. This refers to only as feed for animals which are themselves being produced within the farm unit and such feed may not be sold or otherwise marketed as organic. Feed produced on the farms in accordance with the national standards is to be preferred over conventionally grown, brought in feeds.

II. Fertilization Policy

General Principles

Sufficient quantities of biodegradable material of microbial plant or animal origin should be returned to the soil to increase or at least maintain its fertility and the biological activity within it. Biodegradable material of microbial plant or animal origin produced on organic farms should form the basis of the fertilization programme.

Recommendations

- Fertilization management should minimize nutrient losses.
- Accumulation of heavy metals and other pollutants should be avoided.
- Non-synthetic mineral fertilizers and brought in fertilizers of biological origin should be regarded as supplementary and not a replacement for nutrient cycling.
- Adequate pH levels should be maintained in the soil.

Standards

1. Biodegradable material of microbial plant or animal origin shall form the basis of the fertilization programme.
2. The certification programme shall set limitations to the total amount of biodegradable material of microbial plant or animal origin brought onto the farm unit, taking into account local conditions and the specific nature of the crops.
3. The certification programme shall set standards which prevent animal runs from becoming over manured where there is a risk of pollution.
4. Manure containing human excreta shall not be used on vegetation for human consumption.
5. Mineral fertilizers shall only be used in a supplementary role to carbon based materials. Permission shall only be given when other fertility management practices have been optimized.
6. Mineral fertilizers shall be applied in their natural composition and shall not be rendered more soluble by chemical treatment. The certification programme may grant exceptions which shall be well justified.
7. The certification programme shall lay down restrictions for the use of inputs such as mineral potassium, magnesium fertilizers, trace elements, manures and fertilizers with a relatively high metal content and or other unwanted substances, e.g. basic slag, rock phosphate and sewage sludge.
8. All synthetic nitrogen fertilizers including urea are prohibited.

III. Animal Husbandry Management

General Principles

Management techniques in animal husbandry should be governed by the physiological and ethological needs of the farm animals in question. This includes:

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- Animals should be allowed to conduct their basic behavioral needs.
- All management techniques including those where production levels and speed of growth should be concerned, for the good health and welfare of the animals.

Recommendations

- For welfare reasons, the herd or flock size should not adversely affect the behavioral patterns of the animal.

Standards

1. The certification programme shall ensure that the management of the animal environment takes into account the behavioral needs of the animals and provides for
 - Sufficient free movement.
 - Sufficient fresh air and natural day light according to the needs of the animals.
 - Protection against excessive sunlight, temperatures, rain and wind according to the needs of the animals.
 - Enough lying and or resting area according to the needs of animals. For all animals requiring bedding, natural materials shall be provided.
 - Ample access to fresh water and feed according to the needs of the animals.
 - Adequate facilities for expressing behavior in accordance with the biological and ethological needs of the species.
 - No compounds used for construction materials or production equipment shall be used which might detrimentally affect human or animal health.
2. All animals shall have access to open air and or grazing appropriate to the type of animal and season taking into account their age and condition to be specified by the certification programme. The certification programme shall allow exceptions in cases where:
 - The specific farm or settlement structure prevents such access provided animal welfare can be guaranteed.
 - Areas where feeding of animals with carried fresh fodder is a more sustainable way to use land resources than grazing providing animal welfare is not compromised.
 - Restrictions shall always include a time limit which shall be set for each exception.

- Poultry and rabbits shall not be kept in cages.
- Landless animal husbandry system shall not be allowed.
- 3. When the natural day length is prolonged by artificial lighting, the accredited certification programme shall prescribe maximum hours respective to species, geographical considerations and general health of animals.
- 4. Herd animals shall not be kept individually.

The accredited certification programme may allow exceptions, e.g. male animals, small holdings, sick animals and those about to give birth.

IV. Length of Conversion Period

General Principles

The establishment of organic animal husbandry requires an intern period, termed the conversion period.

Recommendations

- The whole farm, including livestock should be converted according to the standards set down. Conversion may be accomplished over a period of time.
- Replacement poultry should be brought onto the holding at the start of the production enterprise.

Standards

- Animal products may be sold as organic agriculture only after the farm or relevant part of it has been under conversion for at least twelve months and providing the organic animal production standards have been met for the appropriate time.
- The accredited certification programme shall specify the length of time for which the animal production standards shall have been met. With regard to dairy and egg production this period shall not be less than 30 days.
- Animals present on the farm at the time of conversion may be sold for organic meat when the organic standards have been met for 12 months.

V. Brought-in Animals

General Principles

All organic animals should be born and raised on the organic holding.

Recommendations

- Organic animal husbandry should not be dependent on conventional raising systems. When trading or exchanging livestock, it should preferably take place between organic farms or as part of a long term cooperation between specific farms.

Standards

- When organic livestock is not available, the accredited certification programme shall allow brought – in conventional animals according to the following age limits
 - 2 days old chicks for meat production.
 - 18 weeks old hens for egg production.
 - 2 weeks old for any other poultry.
 - Piglets up to 6 weeks and after weaning.
 - Calves up to 4 weeks old that have received colostrums and are fed a diet consisting mainly of full milk.

Accredited certification programme shall set time limits (not exceeding 5 years) for implementation of certified organic animals from conception for each type of animal.

- Breeding stock may be brought in from conventional farms. A yearly maximum than 10% if the adult animals of the same species on the farm.
- For brought in breeding stock the accredited certification programme shall allow a higher yearly maximum than 10% in the following cases and with specific time limits.
 - Unforeseen severe natural or manmade events
 - Considerable enlargement of farms
 - Changing breeds
 - Small holdings

VI. Breeds and Breeding

General Principles

Breeds should be chosen which are adapted to local conditions. Breeding goals should not be in opposition to animals' natural behavior and should be directed towards good health.

Recommendations

- Breeding shall not include methods that make the farming system dependant on high technological and capital intensive methods.
- Reproduction techniques should be natural.

Standards

- The accredited certification programme shall ensure that breeding systems are based on breeds that can copulate and give birth naturally.
- Artificial insemination is allowed only upon veterinary necessity.
- Embryo transfer techniques are not allowed.
- Hormonal heat treatment and induced birth are not allowed unless applied to individual animals for medical reasons and under veterinary advice.
- The use of genetically engineered species or breeds is not allowed.

VII. Mutilations

General Principles

The animals' distinctive characters should be respected.

Recommendations

- Species shall be chosen which don't require mutilation.
- Exception for mutilations shall only be given so that suffering can be kept to the minimum.

Standards

- Mutilation are not allowed

The accredited certification programme shall allow the following exceptions:

- Castrations
- Tail docking of lambs
- Dehorning
- Ringing
- Mulesing

Suffering shall be minimized and anesthetics used where appropriate.

VIII. Animal Nutrition

General Principles

The livestock should be fed 100% organically grown feed of good quality. All feed shall come from the farm itself or be produced within the region. The diet shall be offered to the animals in a form allowing them to execute their natural feeding behavior and digestive needs.

Recommendations

- The diet should be balanced according to the nutritional needs of the animals. Products from the organic food processing industry shall be used. Colouring agents shall not be used in organic livestock production.

Standards

- The accredited certification programme shall draw up standards for feed and feed ingredients.
- The prevailing part (at least more than 50%) of the feed shall come from the farm unit itself or shall be produced in cooperation with other organic farms in the region.

The accredited certification programme shall allow exception with regard to local conditions under a set time limit for implementation.

- For calculation purposes only, feed produced on the farm unit during the first year of organic management, may be classed as organic. This refers only to feed for animals which are themselves being produced within the farm unit and such feed may not be sold or otherwise marketed as organic (2.2.4).
- Where it proves impossible to obtain certain feeds from organic farming sources, the accredited certification programme shall allow a percentage of feed consumed by farm animals to be sourced from conventional farm. The maximum percentage of such feeds are given in the following table and shall be calculated in terms of the average diet for each animal category.
- These maximum percentages shall be followed the whole year round:
 - Ruminants (dry matter intake) – 15%
 - Non-ruminants (dry matter intake) – 20%

The percentage will be reduced within 5 years to

- Ruminants (dry matter) – 10%
- Non-ruminants (dry matter) – 15%

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The accredited certification programme shall allow exception to this percentage, with specific time limits and conditions in the following cases

- Unforeseen natural or manmade events
- Extreme climate or weather conditions
- Areas where organic agriculture is in initial stages of development.

The following products shall not be included nor added to the feed given to farm animals

- Synthetic growth regulators
- Synthetic appetizers
- Preservatives (except when used as a processing aid)
- Colouring agents
- Urea
- Farm animal by products (Slaughter house waste)
- Medicated feeds
- GMO feeds (genetically modified/engineered organisms or products)
- Hormones
- Droppings, dung or other manure (all types of excreta) even if technologically processed.
- Fees subjected to a solvent (e.g. hexane), extraction (soya and rape seed meal) or the addition of other chemical agents.
- Pure amino acids
- Vitamins, trace elements and supplements shall be used from natural origin when available in appropriate quantity and quality.

The accredited certification programme shall define conditions for use of vitamins and minerals from synthesized or unnatural sources.

- All ruminants shall have daily access to roughage.
- The following preservatives shall be used
 - Bacteria, fungi and enzymes
 - By-products of food industry
 - Plant based products

Synthetic chemical fodder preservatives shall be allowed in special weather conditions. The accredited certification programme shall specify conditions for

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use of substances from synthesized or unnatural sources, e.g. acetic, formic and propionic acid, vitamins and minerals.

- The accredited certification programme shall set minimum weaning times taking into account the natural behavior of the relevant animal species.
- Young stock from mammals shall be raised using systems that rely on organic milk, preferably from their own species.
- In emergencies the accredited certification programme shall allow the use of milk from non-organic farming systems or dairy based milk substitutes so long as they don't contain antibiotics or synthetic additives.

IX. Veterinary Medicine

General Principles

Management practices should be directed to the well being of animals, achieving maximum resistance against disease and preventing infections. Sick and injured animals shall be given prompt and adequate treatment.

Recommendations

- Natural medicines and methods, including homeopathy, ayurvedic medicine and acupuncture, shall be emphasized.
- When illness does occur, the aim should be to find the cause and prevent future outbreaks by changing management practices.
- Where appropriate the accredited certification programme should set conditions based on the farm's veterinary record to minimize the use of medicines.
- The accredited certification programme should make list of medicines specifying the withholding periods.

Standards

- The well-being of the animals is the primary consideration in the choice of illness treatment. The use of conventional veterinary medicines is allowed when no other justifiable alternative is available.
- When conventional veterinary medicines are used, the withholding period shall be twice the legal period.
- Use of the following substances is prohibited
 - Synthetic growth promoters
 - Substances of synthetic origin for production stimulation or suppression of natural growth.

- Hormones for heat inducting and heat synchronization unless used for an individual animal against reproductive disorders, justified by veterinary indications.
- Vaccinations shall be used only when diseases are known or expected to be a problem in the region of the farm and where these diseases cannot be controlled by other management techniques. The accredited certification programme shall define conditions for such cases.
- Legally required vaccines are allowed whereas genetically engineered vaccines are prohibited.

X. Transport and Slaughter

General Principles

Transport and slaughter should minimize stress to the animal. Transport distance and frequency should be minimized. The transport medium should be appropriate for each animal.

Recommendations

- Animals should be inspected regularly during transport.
- Animals should be watered and fed during transport depending on weather conditions and duration of the transport.
- Stress to the animal shall be minimized, especially taking into consideration:
 - Contact (by eye, ear or smell) of each animal with dead animals or animals in the killing process.
 - Existing group ties.
 - Resting time to release stress.
- Each animal shall be stunned before being bled to death. The equipment used for stunning should be in good working order. Exceptions can be made according to cultural practice where animals are bled without prior stunning. This should take place in a calm environment.

Standards

- Throughout different steps of the process, there shall be a person responsible for the wellbeing of the animal.
- Handling during transport and slaughter shall be calm and gentle. The use of electric sticks and such instruments are prohibited.
- *The accredited certification programme shall set slaughter and transportation standards that will take into consideration:*

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- Stress caused to the animal and person in-charge.
 - Fitness of the animal
 - Loading and unloading
 - Mixing different groups of animals or animals of different sex.
 - Quality and suitability of mode of transport and handling equipment.
 - Temperature and relative humidity
 - Hunger and thirst
 - Specific needs of each animal.
- No chemical or synthesized tranquilizers or stimulants shall be given prior to or during transport.
 - Each animal or group of animals shall be identified during all steps.
 - When the transport is by road, the journey time to the slaughter house shall not exceed 8 hours.
 - Accredited certification programme may grant exceptions on a case by case basis.

The Conversion Requirements – How to Convert a Conventional Farm to Organic Farm

Whenever, a farmer wishes to convert or switchover to organic farming from traditional or chemical based farming, he has to take note of and follow the requirements set for conversion. The standards for conversion are dealt separately in any organic standards document. One has to appraise oneself about these requirements for conversion as mentioned invariably in all the standards developed by various agencies and countries across the world. The situation as a whole asks for intervention by both the agricultural scientists and farmers to plan to start or convert to the organic food production as well as step by step execution of the same.

A close perusal of the principles and objectives of organic animal husbandry amply make it clear that Organic animal husbandry is based on the harmonious relationship between land, plants and animals. It meets their physiological needs and supports their natural and social behavior and wellbeing. The objectives of organic animal husbandry are to treat animals respectfully, assure their health and welfare and preserve the environment. It is aimed that Organic animal husbandry is consistent with local conditions. This is attained by choosing or using animal breeds and breeding techniques that are appropriate for the environment and the wellbeing of the animal itself. Organic animal production is integrated with organic crop

production systems and supplies organic feed to animals in a manner that meets their natural foraging behavior. It is attempted to provide a diet to the animals that consists of high quality and nutritious organic feed. Organic animal husbandry treats animals with respect and care and maintains their organic integrity throughout the system. Under the organic management of animals, it is attempted to minimize stress and suffering and maintain organic integrity of the animals during their movement, handling and slaughter. In order to achieve these objectives, standards are developed by various countries and associations across the world which require in general, that –

A. Management

- Living conditions (including housing) provided to the animals:
 - Afford them comfort and safety
 - Allow them to exhibit natural behavior
 - Give them freedom of movement
 - Allow access, whenever weather allows, to open air, exercise areas and/ or,
 - Pasture, which include shade.
- Nutrition practices are consistent with the animals' natural needs.
- There is a weaning period for young animals, which is based on the natural behavior of the species.
- Stocking density management ensures sustainable land and water use.

B. Breeds and Breeding

- Animal production systems use breeds suited to the region and the production method.
- Animal production systems use breeds that reproduce successfully under natural conditions and without routine human involvement.
- Only breeding techniques consistent with organic production methods are used. This includes artificial insemination.
- Hormones to induce ovulation and birth unless for medical reasons should not be allowed.
- Employing embryo transfer techniques and cloning is prohibited.

C. Animal Nutrition

- Feed rations meet the nutritional and dietary requirements of the species and ruminants have access to roughage.
- The use of non-organic feed is specified, is strictly limited to non-accessibility of organic feed and time limited.
- Vitamins, trace elements and supplements are from natural sources unless they are not available in sufficient quantity and/or quality.
- Practices like feeding, a. slaughter waste to ruminants; b. slaughter products of the same species; c. all types of excrements; d. any product subjected to solvent extraction (e.g. hexane) or the addition of other chemical agents; synthetic amino-acid and amino acid isolates; f. urea and other synthetic nitrogen compounds; g. synthetic growth promoters or stimulants; h. synthetic appetizers, preservatives and colouring agents are prohibited.

D. Animal Health and Welfare

- Health care practices follow the principle of positive health; the graduated approach of prevention, including appropriate vaccinations, then natural medicines and treatment, and finally if unavoidable, treatment with allopathic drugs.
- Medical treatment considered necessary for the welfare of an animal is never withheld in order to maintain the organic status of the animal. Animals are not allowed to suffer for lack of treatment.
- The use of antibiotic and other allopathic medication is strictly limited to the treatment of illness and injuries under the supervision of qualified personnel, and subject to defined withdrawal period that are not less than double that required by legislation.
- Mutilations are prohibited. Standards may allow specific exemptions when good management practices are insufficient to ensure the health and welfare of the animal and/or operator or when it is specifically required for meat quality. Mutilations performed under exceptions employ measures to minimize suffering.
- Practice like cruelly treating and forcefully handling animals; operating landless animals husbandry systems; confining calves for veal production keeping any animals confined in cages; using hormones or other drugs to promote growth and production, routinely using antibiotics and parasiticides when there is no risk of illness are generally discouraged or strictly prohibited.

E. Transportation and Slaughter

- The organic integrity of the animal is maintained during movement, handling and slaughter. It means animals raised following organic standards are not intermingled with those raised conventionally.
- Measures are taken to minimize stress and avoid suffering during transit and holding prior to and during slaughter.
- Using any injurious devices, electric prods, tranquilizers, and stimulants are prohibited.

The following impact points must be considered when converting to an organic system of production for livestock:

1. Animals should not be fed with feeds, which incorporate feed additives like growth hormones, bacteriostats etc.
2. Animal waste, e.g. poultry manure shall not be used to feed livestock.
3. Animal manures require to be handled properly, removed from animals housed regularly and be composted before taking them to the fields to kill harmful organisms that may be present, for example, nematodes.
4. The health of animals shall be paramount, thus, selection for breeding animals should be based on the resistance to diseases and pests. The farmer should administer only the herbal and natural treatment, whereas conventional drugs may only be used as a last resort to save the life of the animals. In this case, animal products may not be certified as from an organic source for the next three (3) months.
5. The farm should strive to produce most of the feeds from the farm to avoid procurement of contaminated feeds from other sources.

Organic animal husbandry promotes use of clean and healthy products from animals for our own health, protects and environment, brings down the cost of production and is the system to watch for now and the future in the livestock production.

General Requirements for Plant Production and Animal Husbandry

Organic agriculture attains productivity and ecological balance through the design and management of sustainable farming systems. Thus, emphasis should be given on the design and management of a production unit in such a way that productivity is attained without compromising the environmental quality or disturbing the ecological balance. It should be clearly identified when organic practices begin

and how long they have to be applied before the operation and products can be considered organic, taking into consideration the balance of the ecosystem and the skills of the operator.

Following factors should be kept in mind by the potential converter of his farm:

- The date or event on which conversion begins should be clearly stated for record.
- From the date of start of conversion, a set period of time should be elapsed between the start of the conversion period and the achievement of the organic status of the corresponding land, animals and products. Normally, it takes 1-3 years conversion period before we could say any farm has achieved organic status while following all the guidelines set for organic production during the interim period.

This is done to establish a suitable period of organic management prior to the organic status of a crop, during which contaminants are reduced, and healthy soils and sustainable ecosystems are being established. In case of animals, organic production practice are applied to the entire life cycle of the animals with no breaks in the organic management so as to ensure the health and well being of individual animals. Animals are raised organically from birth or hatching, or when this is not possible from early ages subject to a conversion requirements. There are specific conversion period for each species purpose and production type, which are no less than the following:

Production	Conversion period
Meat (except poultry)	12 months
Dairy	90 days
Poultry meat/eggs	42 days

LIVESTOCK, POULTRY AND PRODUCTS

3.2.1 GENERAL PRINCIPLES

Livestock and poultry make important contributions to organic integrated farming system by:

- 3.2.1.1 providing manure to supplement nutrients to the crops thereby improving soil’s organic matter for maintaining the fertility of the soil;
- 3.2.1.2 providing beneficial micro-flora through its excreta to maintain interdependence of soil-plant, plant-animal and animal-soil.

- 3.2.1.3 providing urine that can be used in agriculture pest and disease management when used alone or in combination with other organic matters.
- 3.2.1.4 enhancing biodiversity;
- 3.2.1.5 enhancing the diversity of the farming system by permitting use of crop residues as feed, thereby reducing environment pollution;
- 3.2.1.6 providing agricultural self-vocation even to small and marginal farmers provided the principles of organic farming are followed.

3.2.2 THE CHOICE OF BREEDS/STRAINS

The choice of Livestock and Poultry, breeds, strains and breeding methods shall be consistent with the principles of organic farming, taking into account in particular:

- 3.2.2.1 their adaptation to the local climatic and socio-economic conditions;
- 3.2.2.2 their vitality and resistance to diseases;

3.2.3. THE SOURCES/ORIGIN

Animals must have been born or hatched from production units complying with these guidelines, or must be the offspring of parents raised under the conditions set down in these guidelines.

- 3.2.3.1 Transfer of Livestock and Poultry between organic and non-organic units shall not be permitted. The Inspection and Certification agency shall ensure that brought-in Livestock and Poultry from other units comply with these Guidelines.
- 3.2.3.2 Livestock and Poultry raised on non-organic production units shall be converted into organic unit as per these Guidelines;
- 3.2.3.3 When an Operator demonstrate to the satisfaction of the Inspection and Certification Agency for the organic source, breed and required management are not available, the agency may allow such Livestock and Poultry under the following circumstances:
 - 3.2.3.3.1 when the Operator is establishing an organic Livestock and Poultry operation for the first time;
 - 3.2.3.3.2 when a farmer wants to change the Livestock and Poultry breed/strain or when new Livestock and Poultry specialization is developed;
 - 3.2.3.3.3 for the renewal of a herd, e.g. high mortality of animals caused by catastrophic circumstances;

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- 3.2.3.3.4 when the farmer wishes to introduce breeding males into the farm.

In such cases the young animals that are introduced to the organic farm shall be as young as possible, preferably as soon as they are weaned.

3.2.4 RECORD KEEPING AND ANIMAL IDENTIFICATION

- 3.2.4.1 The animals shall bear unique identification number in accordance with the national standards. The Operator or the veterinarian in-charge shall maintain detailed and up-to-date records as set out in Annexure I.

3.2.5 HOUSING AND MANAGEMENT

- 3.2.5.1 Livestock and Poultry should be maintained under natural conditions as far as possible. This should include utilizing natural breeding methods, housing and management conditions to minimize stress, health management system to prevent diseases with an ultimate aim to progressively limit use of chemical allopathic veterinary drugs (including antibiotics and hormones), reduce feeding of animals with products of animal origin (e.g. meat meal, blood meal), and ensure animal comfort and welfare.
- 3.2.5.2 The housing and day-to-day management of the animal, maintenance of sanitation, hygiene and environment shall be planned to suit the specific behavioral needs of the Livestock and Poultry and shall provide for:
- 3.2.5.2.1 sufficient space to ensure free movement and opportunity to express normal patterns of behavior;
 - 3.2.5.2.2 the animals should not be tied unless required for specific reasons, such as, at the time of milking or restrain for some procedures;
 - 3.2.5.2.3 where the Livestock and Poultry normal behavior demands group living, animals should not be kept in single but should have company of like kind;
 - 3.2.5.2.4 as far as possible two different kinds of animals should not be kept together, unless for specific purposes, such as, free range poultry birds in cow/buffalo shed for scavenging on ticks and other insects;
 - 3.2.5.2.5 the housing system should ensure prevention of abnormal behavior, injury and disease;
- 3.2.5.3 Appropriate facilities to cover emergencies such as the fire, the breakdown of essential mechanical services and the disruption of supplies shall be available.

- 3.2.5.4 Housing for Livestock and Poultry shall not be mandatory in areas where appropriate climatic conditions exist to enable animals to live outdoors without compromising their comfort, health and welfare. Conditions shall be inspected and permitted by the Inspection and Certification Agency on Operator and location-to-location basis.
- 3.2.5.5 Housing conditions should meet the biological and behavioral needs of the Livestock and Poultry by providing:
 - 3.2.4.5.1 easy access to feeding and watering;
 - 3.2.4.5.2 insulation, heating, cooling and ventilation of the building to ensure that air circulation, dust level, temperature, relative air humidity and gas concentrations are kept within limits which are not harmful to the Livestock and Poultry;
 - 3.2.4.5.3 plentiful natural ventilation and light to enter;
 - 3.2.4.5.4 appropriate fencing not harmful to the animals
- 3.2.5.6 Confinement shall be permitted under the following conditions:
 - 3.2.5.6.1 inclement weather to protect animals from injury;
 - 3.2.5.6.2 ensure health safety or welfare;
 - 3.2.5.6.3 protect plant, soil and water quality;
- 3.2.5.7 The stocking density shall provide comfort and well-being of the Livestock and Poultry with regard to the species, the breed and the age; behavioral needs with respect to the size of the group and the sex of the Livestock and Poultry; sufficient space to stand naturally, lie down easily, turn round, groom themselves, and assume all natural postures and movements such as stretching, lying and rumination and wing flapping in case of birds (Annexure II and III).
- 3.2.5.8 The sanitation and hygiene in the Livestock and Poultry farm shall be as per the national/provincial standards and must follow the standard operating protocols to keep the house, pens, equipment and utensils clean and free from microbial contamination.
- 3.2.5.9 Free-range, open-air exercise areas, or open-air runs should, if necessary, provide sufficient protection against rain, wind, sun and extreme temperatures, depending on the local weather conditions and the breed concerned.

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- 3.2.5.10 The outdoor stocking density of Livestock and Poultry kept on pasture, grassland, or other natural or semi-natural habitats, shall be low enough to prevent degradation of the soil and over-grazing of vegetation.
- 3.2.5.11 Mammals
- 3.2.5.11.1 All mammals must have access to open-air exercise or resting area, paddock or run which may be partially covered or should have space for protection from rains and excess if in the open area. The animals must be able to use those areas whenever the physiological condition of the animal or the weather conditions and the state of the ground permit.
 - 3.2.5.11.2 The Inspection and Certification Agency shall grant exceptions for the access of males or bulls to open areas to avoid mixing with female animals for controlled breeding. The other animals may also not have access open-air exercise area or run during the winter period or the final fattening phase.
 - 3.2.5.11.3 Livestock shed must have properly laid and smooth but not with slippery floors. The floor shall not be entirely of slatted or grid construction.
 - 3.2.5.11.4 The housing standards must be in accordance with the standards laid down in the national or provincial guidelines and shall aim at providing comfortable, clean and dry laying/rest area of sufficient size, consisting of a solid construction. Wherever possible, straw bedding shall be provided.
 - 3.2.5.11.5 The calves of different age groups must be housed separately and never in the adult animal shed. Tethering of Livestock and Poultry is not permitted except under certain conditions, which may be permitted by the Inspection and Certification Agency.
 - 3.2.5.11.6 Pigs must be kept in groups, except in the last stages of pregnancy and during the suckling period. Piglets may not be kept on flat decks or in piglet cages. Exercise areas must permit dunging and rooting by the animals.
 - 3.2.5.11.7 The keeping of rabbits in cages shall not be permitted. Code of Practice for Sheep and Goat Housing shall be as per IS 2733:1985

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3.2.5.12 Poultry

- 3.2.5.12.1 Poultry for organic products shall be reared in open-range conditions and shall have free access to open-air run whenever the weather conditions permit.
- 3.2.5.12.2 Housing of poultry in cages shall not be permitted.
- 3.2.5.12.3 Water fowl/duck shall have access to a stream, pond or lake whenever the weather conditions permit.
- 3.2.5.12.4 Poultry house floor shall be of solid construction covered with litter material such as straw, wood shavings, sand or turf. In case of layers, the floor area must be large enough to permit dropping collection. Perches/ higher sleeping areas of a size and number commensurate with the species and size of the group and of the birds and exit/entry holes of an adequate size must be provided.
- 3.2.5.12.5 In the case of laying hens manipulation of day length may be permitted with use of artificial lights. The maximum day length shall be 16 hr with minimum of 8 hr of natural light (Annexure IV).
- 3.2.5.12.6 The Operator shall follow the all-in all-out system of rearing and shall avoid mixing of different age groups of birds, species and breeds. Mixed farming of Poultry and Pigs shall not be permitted. Between each batch, the house shall be emptied, and runs shall be left to allow the vegetation to grow.

Code of Practice for Poultry Housing shall be as per IS 2732:1985
- 3.2.5.12.7 Each Poultry house shall not contain more than:
 - ◆ 4800 chickens
 - ◆ 3000 laying hens
 - ◆ 5200 guinea fowl
 - ◆ 4000 female ducks and 3200 male ducks
 - ◆ 2500 turkeys
- 3.2.5.12.8 Poultry shall have access to an open area for at-least one third of their life.
- 3.2.5.13 Livestock and Poultry not reared in accordance with these provisions may also be maintained on the production unit provided that they are segregated and

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reared separately from the organically maintained animals under the rules.

- 3.2.5.14 All animals must have access to proper ventilation and open-air runs. The Inspection and Certification agency may permit exceptions in case of the physiological, inclement weather conditions or under certain 'traditional' farming systems that restrict access of animals to paddock. But in such cases it should be ensured that the welfare of the animals is not compromised.
- 3.2.5.15 Stocking rates for Livestock and Poultry should be appropriate for the region in question taking into consideration, general climatic conditions, fodder production capacity, stock health, nutrient balance, and environmental impact (Annexure III)

3.2.6 CONVERSION

The establishment of Organic Animal Husbandry requires an interim period, the Conversion period.

3.2.6.1 Conversion Period for Animal Production

The conversion period shall be for three years. The conversion period can be reduced up to one year in the following cases.

- 3.2.6.1.1 Open-air runs and exercise areas used by non-herbivore species;
- 3.2.6.1.2 for dairy herds converted for the first time and for bovine, ovine, pig and caprine coming from extensive husbandry system during an implementation period;
- 3.2.6.1.3 simultaneous conversion of Livestock and Poultry and land used for raising feed/fodder within the same unit should be a preferred approach. In such cases wherein the existing Livestock and Poultry and their offspring are fed mainly with products from the unit, the conversion period for the Livestock and Poultry, pasture and/or land used for animal feed, may be reduced to two years.

The conversion period shall be determined by Inspection & Certification agency and the Conversion Period shall be accounted from the day of registration.

3.2.6.2 Conversion period for animal products

- 3.2.6.2.1 In cases, where the land and Livestock and Poultry conversion to organic status is not simultaneous and the land alone has reached organic status and the Livestock

and Poultry from a non-organic source is introduced, these must be reared according to these Guidelines for at least the following compliance periods before their products are to be sold as organic:

3.2.6.2.1.1 Bovine including buffalo

3.2.6.2.1.1.1 Meat products: 12 months and at least 3/4th of their life span is spent in the organic management system;

3.2.6.2.1.1.2 Calves for meat production: 6 months when brought in as soon as they are weaned and less than 6 months old;

3.2.6.2.1.1.3 Milk products: 90 days during the implementation period established by the competent authority, after that, six months.

3.2.6.2.1.2 Ovine and caprine

3.2.6.2.1.2.1 Meat products: six months;

3.2.6.2.1.2.2 Milk products: 90 days during the implementation period established by the competent authority, after that, six months.

3.2.6.2.1.3 Pig

3.2.6.2.1.3.1 Meat products: Six months.

3.2.6.2.1.4 Poultry

3.2.6.2.1.4.1 Meat products: from the second day to the entire life span as determined by the Inspection and Certification Agency;

3.2.6.2.1.4.2 Eggs: six weeks.

3.2.7 FEED

3.2.7.1 Livestock and Poultry farms shall provide maximum diet from feedstuffs (*including 'in conversion' feedstuffs*) produced as

organic as per the requirements of these guidelines. Agricultural processed residues of organic origin, such as from grain fermentation, fruit processing, vegetable processing, etc., shall be permitted for purpose of feeding provided that the overall feeding practices satisfy the daily energy and nutrient requirements of the concerned animals.

- 3.2.7.2 The agriculture land committed to cultivation of feed/fodder crops intended to be used as feed for Livestock and Poultry shall be organically grown.
- 3.2.7.3 During the operations, the products shall maintain their organic status provided that Livestock and Poultry are fed with at least 85% for ruminants and 80% for non-ruminants calculated on a dry matter basis, feed obtained from organic sources that have been produced in compliance with these Guidelines.
- 3.2.7.4 Notwithstanding the above guidelines, where an operator can demonstrate to the satisfaction of the Inspection and Certification Agency that feedstuffs satisfying the requirement outlined in 3.2.7.2 and 3.2.7.3 are not available, due to, for example, unforeseen severe natural or man-made events or extreme climatic weather conditions, drought, crop failure, etc., permission shall be granted to allow a restricted percentage of feedstuffs not produced according to these guidelines to be fed for a limited time, provided that it does not contain genetically engineered/modified organisms or products thereof. The Inspection and Certification Agency shall set both the maximum percentage of non-organic feed allowed and any conditions relating to this derogation.
- 3.2.7.5 Specific Livestock and Poultry rations should take into account:
 - 3.2.7.5.1 the need of young animals for natural feed, such as, feeding of maternal milk, milk from other mammals or milk replacer of organic origin that has maximum similarity with maternal milk, provided that it does not contain any genetically modified ingredient, antibiotics, hormone, etc..
 - 3.2.7.5.2 that in herbivores, substantial proportion of the dry matter and energy in the daily rations should consist of roughage, fresh or dried fodder, or silage; need for inclusion of cereals in the fattening phase of poultry; Livestock and Poultry must have ample, free access to water appropriate to maintain full health and productivity.

- 3.2.7.6 Due to reasons of animal welfare, health and productivity, if supplements are to be added, it shall be permitted on advice of a qualified veterinarian. The permitted list of such supplements, feed stuffs, probiotics, biologicals, immunolgicals, etc., that comply the following criteria are at Annexure V .
- 3.2.7.7 General Criteria for feedstuff and nutritional criteria Substances shall be permitted as per annexure V satisfying clause 3.2.7. Such substances:
- 3.2.7.7.1 should significantly satisfy feeding requirements of the Livestock and Poultry fulfilling the physiological, behavioral and welfare needs of the concerned species; and
 - 3.2.7.7.2 does not contain genetically engineered/modified organisms and products thereof; and are non-synthetic and are primarily of plant, mineral or animal origin.
- 3.2.7.2 Specific Criteria for Feedstuffs and Nutritional Elements
- 3.2.7.2.1 The feedstuffs under Annexure V should not be prepared by using chemical solvents and chemical treatment. All the ingredients of the feed including supplements, fed to organic animals should be from organic sources. In case of shortage of these substances, or in exceptional circumstances, well-defined analogic substances may also be used (Annex. VI).
 - 3.2.7.2.2 Feedstuffs of animal origin, with the exception of milk and milk products, fish, other marine animals and products derived thereof shall not be used. The feeding of mammalian material to ruminants is not permitted with the exception of milk and milk products;
 - 3.2.7.2.3 Synthetic nitrogen or non-protein nitrogen compounds shall not be used.
- 3.2.7.3 Specific Criteria for Additives and Processing Aids:
- 3.2.7.3.1 The supplements should be from natural sources and in compliance with the list published by the competent authority (Bureau of Indian Standards-BIS).
 - 3.2.7.3.2 Feed processing aiding supplements like, binders, anti-caking agents, emulsifiers, stabilizers, thickeners, surfactants, coagulants if used should be from natural sources

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- 3.2.7.3.3 Antioxidants: only from natural sources would be permitted
- 3.2.7.3.4 Preservatives: only natural acids are allowed;
- 3.2.7.3.5 Colouring agents (including pigments), flavours, odour masking agents and appetite stimulants: only natural sources are allowed;
- 3.2.7.3.6 Probiotics, enzymes and microorganisms are allowed; but should not be from genetically modified sources.
- 3.2.7.3.1 Any synthetic chemicals, such as, antibiotics, coccidiostat, medicine, growth promoters or any other substance supplemented for purpose to stimulate growth or production shall not be fed to the Organic livestock and poultry.
- 3.2.7.3.1 Silage additives, additives for enriching crop residues and processing aids may not be derived from genetically engineered/modified organisms or products thereof, and may comprised only:
 - Sea salt;
 - Coarse rock salt;
 - Yeasts;
 - Enzymes;
 - Whey;
 - Sugar; or sugar products such as molasses, jaggary, grain bran;
 - Honey;
 - lactic, acetic, formic and propionic bacteria, or their natural acid product when the weather conditions or the fodder harvesting conditions could be perceived as a constraint to adequate fermentation provided that it is approved by the competent authority.

3.2.8 HEALTH CARE

- 3.2.8.1 The organic Livestock and Poultry would, *in general*, should follow the basic principles of preventive health and productivity management wherein the focus would be on preventing diseases, detecting underlying fertility and production problems and its correction primarily on correcting management, nutrition and sanitation. The health care shall be based on the following broad principles:

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- 3.2.8.1.1 the choice of appropriate breeds or strains of animals that can acclimatize, adapt to environment as detailed in Clause 3.2.2 above;
 - 3.2.8.1.2 the setting up of the animal husbandry practices should be appropriate to the requirements of each species and should focus on encouraging strong resistance to disease and prevention of infections;
 - 3.2.8.1.3 the use of good quality organic feed, together with regular exercise and access to fodder/roughages, and/or open-air runs, so as to have positive effects on natural immunological defense of the animal;
 - 3.2.8.1.4 appropriate stocking density of Livestock and Poultry so as to avoid overcrowding and spread of infections or competition to feeding.
- 3.2.8.2 The farm should have established system of detection of sub-clinical, sick or injured animals and if, so detected, must be treated immediately. In cases where isolation is necessary it will be so carried out in suitable housing area. The paramount interest in case of sickness would be animal welfare and mitigating pain and suffering hence the organic Livestock & Poultry operators shall not withhold medication even if the use of such medication will cause the animal to lose its organic status.
- 3.2.8.3 The use of veterinary medicinal products in organic farming shall comply with the following principles:
- 3.2.8.3.1 All vaccinations required by law of the land would be permitted. Where specific disease or health problems occur, or is predicted to occur, and there are no alternative permitted treatment or management practice exists, use of parasiticides, or therapeutic use of veterinary drugs are permitted under prescription and supervision of a registered veterinarian, provided that the mandatory withholding periods as provided under these Guidelines (Annex. VII) shall be observed. In drugs where withdrawal period is not prescribed in these Guidelines a minimum of 48 hours of withdrawal period shall be observed;
 - 3.2.8.3.2 For purpose of treatment and prevention of diseases and under-performances, herbal/phyto-therapeutic (excluding antibiotics), homeopathic or ayurvedic products shall be preferred to allopathic veterinary drugs or antibiotics,

provided that their therapeutic effect is effective for the species of animal and the condition for which the treatment is intended;

3.2.8.3.3 In case alternative therapeutic or preventive measures are unlikely to be effective in combating illness or injury, allopathic veterinary drugs or antibiotics may be used under the responsibility of a veterinarian;

3.2.8.3.4 the use of allopathic veterinary drugs or antibiotics or drugs derived from Genetically Modified source for preventative treatments and for enhancing productivity or fertility is prohibited.

3.2.8.4 Hormonal treatment may only be used for therapeutic reasons and under veterinary supervision.

3.2.8.5 Growth stimulants agents or substances used for the purpose of stimulating growth or production shall not be permitted.

3.2.9 BREEDING AND MANAGEMENT

3.2.9.1 The major focus of Livestock and Poultry management shall be to provide care, comfort, and respect to the animals and ensure their welfare in the farming system.

3.2.9.2 Livestock and Poultry breeding methods should be in accordance with and in compliance with the principles of organic farming and shall take into account:

3.2.9.2.1 the breeds and strains most suited to local conditions;

3.2.9.2.2 the preference for reproduction through natural methods, although artificial insemination may be used ;

3.2.9.2.3 embryo transfer techniques and the use of hormonal reproductive treatment shall not be used unless prescribed as therapeutic directed towards correcting the physiological problem;

3.2.9.2.4 that breeding techniques employing genetic engineering shall not be used.

3.2.9.3 Mutilation, such as, tail docking, cutting of teeth, trimming of beaks and dehorning are not permitted. In exceptional cases, some of these may be authorized by the Inspection and Certification Agency for reasons of safety (*e.g. dehorning in young animals*) or if they are intended to improve the health and welfare of the Livestock and Poultry. Such surgical procedures shall be carried

out by a registered veterinarian at the most appropriate age; and any suffering to and pain must be reduced to a minimum. Wherever possible, anesthetic and analgesics shall be used. Physical castration is allowed only in order to maintain the quality of products and traditional production practices (*meat-type pigs, bullocks, capons, etc*).

3.2.10 MANURE AND URINE EXCRETA MANAGEMENT

- 3.2.10.1 Manure and urine excreta collection and management practices in the organic Livestock and Poultry farm are a critical component. The collection, handling and disposal of the dung and urine from shed, paddock, open run or grazing areas shall be implemented in a manner that:
 - 3.2.10.1.1 minimizes soil and water degradation;
 - 3.2.10.1.2 does not significantly contribute to contamination of water by nitrates, phosphates, and pathogenic bacteria;
 - 3.2.10.1.3 optimizes recycling of nutrients; and
 - 3.2.10.1.4 does not include burning or any practice inconsistent with organic practices.
- 3.2.10.2 All manure storage and handling facilities, including composting facilities shall be designed, constructed and operated to prevent contamination of ground and/or surface water and shall be in accordance with the national standards established for the purpose.
- 3.2.10.3 Manure application rates shall be at levels that do not contribute to ground and/or surface water contamination. The Inspection and Certification Agency shall establish maximum application rates for manure or stocking densities as per local conditions. The timing of application and application methods shall not increase the potential for run-off into ponds, rivers and streams.

3.2.11 TRANSPORT

- 3.2.11.1 During transport the Operator shall prevent stress, injury, *hunger, thirst, malnutrition, fear, distress, physical and thermal discomfort, pain, disease* during the transport and shall observe the following conditions set in law of the land (For *Livestock transport*: IS 14904:2007 and for *Poultry transport*: IS 5238:2001) as given below:

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- 3.2.11.1.1 All necessary arrangement be made in advance to minimize length of the journey and meet the animal's need during the journey;
 - 3.2.11.1.2 Animals must be fit for the intended journey;
 - 3.2.11.1.3 Means of transport as well as the loading and unloading facilities must be designed, constructed, maintained and operated so as to avoid injury and suffering and ensure the safety of the animals;
 - 3.2.11.1.4 People that handle animals must be trained and competent as appropriate for this purpose and must carry out their tasks without using violence or any other method likely to cause unnecessary fear, injury or suffering;
 - 3.2.11.1.5 Transport must carry out without delay to the place of destination and the welfare conditions of the animals must be regularly checked and appropriately maintained;
 - 3.2.11.1.6 Sufficient floor area, height and other spacing requirements must be provided for the animals, appropriate to their size and intended journey; and
 - 3.2.11.1.7 Water, feed and rest must be offered to the animals at suitable intervals and should be appropriate in quality and quantity to their species, size and age.
- 3.2.11.2 Efforts should be made to avoid or reduce following stress factors:-
- 3.2.11.2.1 Stress due to gathering and handling;
 - 3.2.11.2.2 Stress due to deprivation of, or changes in quantity or quality of food and water;
 - 3.2.11.2.3 Stress due to extremes of temperature or change in climatic conditions;
 - 3.2.11.2.4 Stress due to the groupings of animals strange to each other both within and between species;
 - 3.2.11.2.5 Stress due to separation from others of the animals' own kind;
 - 3.2.11.2.6 Stress due to unfamiliar surroundings, noises and sensations;
 - 3.2.11.2.7 Stress due to overcrowding and isolations;

3.2.11.2.8 Stress due to fatigue; and

3.2.11.2.9 Stress due to exposure to disease.

3.2.11.3 Loading and unloading of the animals shall be carried out without the use of any type of electrical stimulation to coerce the animals. The use of allopathic tranquillizers, prior to or during transport, is prohibited.

3.2.11.4 The use of electric stimulation or allopathic tranquilizers shall not be permitted.

3.2.12 SLAUGHTER OF THE ANIMALS

3.2.12.1 The slaughter of Livestock and Poultry should be undertaken in a manner which minimizes stress and suffering, and shall be in accordance with the following national rules framed for the purpose.

3.2.12.2 Livestock (IS 1982:1971)

The by-products shall be from animals subjected to proper ante-mortem and post-mortem inspection. The handling, storage and transport of slaughter-house by-products shall follow IS 8895:1978.

3.2.12.3 Poultry (IS 7049:1973)

For handling, processing, quality evaluation and storage of Poultry, following shall be maintained.

3.2.12.4 The slaughter, evisceration and packing of poultry should be conducted in such a manner as will result in hygienic processing, proper inspection and preservation for the production of clean and wholesome poultry and poultry products.

3.2.12.5 Separate rooms should be provided for:

3.2.12.5.1 Live Poultry receiving and holding.

3.2.12.5.2 Washing and disinfection of coops.

3.2.12.5.3 Slaughter and bleeding.

3.2.12.5.4 Feather removal.

3.2.12.5.5 Evisceration, chilling and packing.

3.2.12.5.6 Inedible products room.

3.2.12.6 Water supply: The quality of water should satisfy the requirements of potable water.

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- 3.2.12.7 Ventilation: Particular attention should be given to ventilation. Illumination should be sufficiently strong, properly situated and should not cause glare.
- 3.2.12.8 Personnel hygiene: Personnel should wear special working clothes of washable material. Proper training shall be given regarding hygiene, frequent hand washing, disinfection etc.
- 3.2.12.9 Ante-mortem and Post-mortem inspection of Poultry shall be done in accordance with IS 6559:1972.
- 3.2.12.10 Activities such as Stunning, Bleeding, Scalding, Plucking, Feet removal, Evisceration and chilling, Draining, Grading etc. shall be done in accordance with IS 7049: 1973.
- 3.2.12.11 The minimum age for Slaughter shall be:-
- ◆ 81 days for chickens
 - ◆ 150 days for capons
 - ◆ 140 days for male turkeys
 - ◆ 100 days for female turkeys
 - ◆ 94 days for guinea fowls
 - ◆ 70 days for female ducks
 - ◆ 84 days for male ducks

5

Animal Breeding, Nutrition and Housing Management in Organic Production System

Organic Dairying

Organic farming including livestock production is basically a land based system, and landless animal husbandry system is forbidden in organic livestock farming. So, landless livestock farmers are not eligible for organic farming unless they go for land leasing. As such, landless livestock keepers who are in big majority in India are not eligible for organic farming, unless they take land on lease so that they can maintain livestock in that leased land. Farmers can raise suitable forage crops to feed their cattle and surplus can be marketed to needy farmers of that region. Forage crops should be grown without any chemical fertilizers and pesticides. Animal manure should be diverted to fields to maintain the fertility of the soil. There should be recycling of nutrients between plants and animals. In nutshell, the feed and fodder requirements have to be met on-farm as far as possible. The landless farmers may find it difficult to meet this requirement of organic dairying, unless they have control on land for growing feed and fodder. To help understand better, organic farming of dairy animals and pigs has been illustrated.

Selection of Breeds

Farmer has to choose a breed that suits local conditions in terms of its disease resistance, maintenance cost and adaptability. If possible, pure breeds have to be maintained. A farmer can maintain an organic farm with local *desi* cattle whose genetic and production potential can be up-graded with bulls of good producing records, if necessary. Farmer can go for breeds like *Red Sindhi*, *Haryana*, *Sahiwal*, *Ongole*, *Vechur*, *Deoni*, *Tharparkar* and others which are proven for their genetic potential.

As per organic standards, all animals should be born and raised on the organic holding. However, a beginner can procure calves from conventional farms, which are of 4 week old that received colostrum and full milk diet. In the same way, breeding stock to a maximum of yearly 10% can be brought in from conventional farms. Animal production record is important along with mothering ability, hardiness

ANIMAL BREEDING, NUTRITION AND HOUSING MANAGEMENT IN ORGANIC PRODUCTION SYSTEM



Organic animal breeding conserves local breeds, improves local practices

and thriftiness, resistance to disease and parasites, ability to forage etc., for which Indian native breeds are naturally endowed.

Farmers have to follow natural reproductive techniques. However, technique like artificial insemination is allowed, which is accepted to meet international standards of organic farming. Practices like embryo transfer technique, hormonal treatment, induced birth and genetically engineered breeds, which are high capital intensive, are not allowed in organic farming practices.

Housing as a Means of Providing Natural Habitation

Housing in organic farming should be according to the behavioral pattern of animals. Farmer should see that there is sufficient free movement with accessibility to fresh air and natural daylight besides protecting the animals from excessive sunlight and rain. Animal should have access to fresh water to meet its requirement. Herd animals should not be kept individually and tethering is not generally allowed in organic farming. If tethering is to be done, it should allow the animal to move freely with sufficient space. Depending upon the system on the farm, some changes to the housing conditions might therefore be inevitable; a change to loose housing for the dairy herd, even though not strictly prescribed, might be seen as beneficial by the individual farmer and implemented as part of the conversion process.

Space requirements for different category of cattle

Group of animals	Indoor space m ² /animal	Solid floor space (indoor) m ² / animal	Yard space (outdoor) m ² /animal
Breeding bulls	10.00	5.0	30.0
Dairy cows	8.0	3.0	4.5
Young stock	1.5	0.75	1.1
< 100 kg			
101-200 kg	2.5	1.25	1.9
201-350 kg	4.0	2.0	3.0
350 kg	5.0	2.5	3.7

Overcrowding shouldn't be done in order to avoid conflict behavior and associated health problems.

Feeding of Livestock in an Organic Farm

A farmer should feed an animal according to its physiological requirements. Diet should be according to animal's natural feeding behavior and digestive needs. Farmer should raise forage crops organically on his own, to feed the livestock. He should see to maximize production of feedstuffs on his farm and the rate of success of organic farm depends on self-sufficiency in feed production. As a rule, 80% of feed should be from organic sources, however, at times of difficulties and emergencies feed from conventional farm may be given with a dry matter content of 15% which has to be gradually reduced to 10% within 5 years. When formulating rations, diet of animal should be balanced by adjusting the protein percentage to complement the forage levels. For example, when rations are based on high protein forage, care should be taken to ensure that energy levels are met by straw or hay to balance the excess protein. Growth regulators, artificial colouring agents, urea, medicated feeds, hormones, chemically extracted feeds, synthetic appetizers etc. are strictly prohibited in feeding the livestock of organic farm.

To supplement the feed of animals, plant based products, byproducts of food industry like molasses; fodder preservatives like bacteria, fungal and enzymatic elements, vitamins, trace elements can be added as per requirement. Raising of calf is more important, as it is the future organic milch animal. Calf should be allowed to suckle according to its natural requirement and proper weaning be done unlike in conventional systems. In case of emergencies, calf may be given milk from non-organic farming systems or dairy substitutes so long as they contain neither antibiotics nor synthetic additives.

Organic livestock farming is still evolving with obvious shortfalls. This underpins the need for more research on alternatives, including on feeds and feeding practices suitable and compatible to organic management practices and standards. For instance, many a times people question how animal production can be done efficiently under organic management without supplementing some of the routinely used items such as synthetic amino acids considered essential in poultry and pig feeding but restricted in organic systems. For this, alternatives need to be worked out so that production and animal do not suffer. The production factors cited as reasons to supplement limiting amino acids may be addressed by changing animal and land management practices, using novel feed sources, and employing better feed handling and feeding practices. Methionine can be sourced from natural sources, since it is also found in many naturally occurring proteins. Alternatives include improved pasture management, and a balanced supplemental ration composed of grains, legumes, and oilseed meals. Temporarily confined poultry can be fed organic corn/soybean ration. Depending on how other parts of the standards evolve and on market conditions, novel organic products can be developed as supplements. It is not established that the forage quality changes as a result of the conversion to organic farming. Yet, there is some evidence that the overall diet fed on organic farms is more diverse than on conventional farms, with a higher proportion of hay and root crops. The livestock farmers that convert their production system from conventional to organic are often faced with the dilemma on what alternative crops can be grown on the farm to improve the diet and performance of the animals.

The organic livestock farmers face a multitude of problems in following the production guidelines. For instance, feed and fodder has to be organically produced, methionine has to be from natural sources, mineral supplementation restricted unless from natural sources. Sometimes these restrictions put animal and farmer in hardships. Taking into account such situations, the local monitoring bodies take appropriate decisions. For instance, National Organic Program (NOP) of United States Department of Agriculture (USDA) announced on 18 September 2008 that the agency has decided to implement a recommendation from the National Organic Standards Board (NOSB) to extend the use of synthetic sources of methionine in organic poultry production until 1 October 2010. The NOSB made this recommendation during its May 2008 meeting, after considering comments from organic poultry producers. The producers' point of view was that, in spite of research on multiple alternatives to the use of the synthetic methionine in poultry feed, practical alternatives from natural sources have not yet been identified. Had the NOP not implemented this extension, the use of synthetic methionine would have been prohibited as of 1 October 2008. The NOP stated that its goal in allowing the extension is to 'provide the organic feed sector the time to create sufficient supplies of wholly natural substitute products' (Coody 2008). Here lies the scope and challenge for researching and developing natural alternatives to medicated conventional feeds which are prohibited under the organic animal production

systems. Most of the research in this area is occurring in temperate areas, where most of the organic livestock production is currently concentrated. The Institute of Organic Farming and Farm Animal Biodiversity at the Agricultural Research and Education Centre (AREC), based in Austria, studies grassland management in context of organic animal husbandry. Whereas, research on organic animal nutrition or organic pastures is yet to take off in tropical countries where farmers' livelihood relies to a large extent on livestock rearing and livestock are raised on pastures.

Health Care: Preventive Management Plays a Major Role

Health care starts with selection of a breed, which has natural immunity against diseases and with good adaptability to local situation. Health care of livestock depends on the manner in which they are raised and the quality of feed offered, which result in maximum disease resistance. In organic livestock farming, preventive management plays major role and moreover, if any illness occurs, farmer should try to find out the cause, and change the managerial practices accordingly in order to prevent future outbreaks.

For treating the sick animals, farmer should give importance to natural medicines and methods including homeopathy, ayurvedic medicine and acupuncture. However, conventional medicines can be used, when no other alternative is available, as the well being of the animal is the primary consideration in organic farming. But, if the animal is on allopathic treatment for two subsequent times, it loses the status of organic. Farmer can vaccinate his animals when diseases are known or expected to be a problem in his farm/region that too with legally required vaccines only. Genetically engineered vaccines are prohibited. Instead of relying on medication, the farmer should strengthen the animal, so that immune system can do its job. Farmer should be well aware that, health care in organic farming starts with selection of suitable breeds, raising the livestock according to its natural requirement; feeding good quality feed along with required grazing to strengthen the immune system of the animal and providing suitable housing to avoid related stress and associated health problems.

Marketing of Organic Products

The growing consumer interest in good quality food products in India signals the need for developing domestic market for local consumption of organic foods. With rising literacy, income and awareness on food quality generated by the mass media like TV, people are increasingly becoming quality conscious. Also, they are increasingly showing their willingness to pay for good quality products. For example, people readily pay extra money for unadulterated milk, which is not necessarily organic milk *per se*. This trend indicates that there is good potential for organic

livestock products for local consumption. The enterprising farmers are now ready to experiment on new ideas on production and marketing, wherein organic livestock products like milk, meat and fish ideally fit. Just like marketing of FMCG and other industrial products market segmentation can be done by the farmers by supplying products to different categories of consumers with varying prices. It is expensive for intensive livestock producers to convert to organic production, but converting extensive, pasture-based systems could become economically more attractive, if price premiums could be captured for organic meat and livestock products (Scialabba and Hattam 2002). There is obvious need for developing local or domestic market for organic livestock products, since export potential for organic livestock products from India is very limited at the moment due to various factors as discussed elsewhere in this book. Moreover, organic farming cannot sustain unless local interest is generated among consumers for organic products, as exports of such products from developing countries has several constraints.

The growing interest in eating out especially by visiting ethnic food jaunts, looking out for something unique, local and something which is natural and healthy while being environmentally safe offers hope for the production and supply of organic livestock products for domestic consumers. The domestic market development is the key for the development of organic animal husbandry in India. The growing market for organic cereals, vegetables, fruits, spices, pulses in Indian metros can be successfully extended to organic livestock products too.

Indian consumers as of today may not be looking exactly for the organic food products as such, but certainly they are interested in and willing to pay for better quality food products. This growing interest of Indian consumers for quality food products is a good sign for the future of organic animal husbandry in India. The Indian consumers need to be made aware, convinced and offered good quality, organically produced livestock products at affordable prices. Agreed, in the initial period, the organic products attract only niche market, but in the long run quality considerations would prevail. The producers initially may consider tapping niche market like restaurants in posh areas in metros, major food chains, five star hotels, army officers' mess, special catering services for MNC executives, airlines etc. This is also the way for promoting local foods prepared from indigenous breeds which are facing the danger of being extinct. There is an urgent need for consumer awareness for organic foods, its environmental and health benefits to augment the demand for organic livestock products. The aware consumer once convinced would create demand for such products giving a push to supply of such products, benefitting the farmers, environment and consumers who would enjoy better quality products. The consumer trust is important, so efforts should be made to win the confidence of the consumers. The consumer is the king, should always be remembered by the producers and retailers.

Farm branded organic milk can serve as an effective way for a small producer to establish an identity and market niche and present possibilities for supplying to national and international markets. Development of other processed foods may itself create a demand for organic products such as milk powder or butter as ingredients in biscuits and confectionary. Give the consumers what they want and to know what they want, pay attention to what they believe?

Indian consumers, for example believe:

- Meat from local breeds/Backyard chicken /eggs taste better and nutritious too!
- Organic milk from local cattle is:
 - ◆ Good for babies, old and sick
 - ◆ Ideal for rituals/ceremonies/ offering in temples
 - ◆ Dairy preparations taste good, last long
 - ◆ nutritious and good for mental growth

Above mentioned beliefs would help boost domestic market for organic livestock products, to start with. Growing number of rich/ elites in India, increased salaries, growing trend on spending for quality life, increasing tastes for trying out something new including innovative foods, growing interest in *deshi* foods are some positive indicators for the future of organic animal husbandry development in India.

Organic livestock products suitable for Indian urban markets

Organic indigenous cow milk	Old persons, young children, patients with terminal diseases like cancer, aids etc.
Organic cow <i>ghee</i>	Temples, Ashrams, old persons
Leather products from organic buffalo farms	Export market

No wonder some *Ashrams/Gaushalas* sell *ghee* at the price double than that of the branded *ghee* available in market. The consumers willingly pay high price just because they like the aroma, purity of product compared to products conventionally produced which lack these preferred attributes.

Record Maintenance - A Must

Farmer has to maintain the records - right from the procurement of livestock, it's feeding, breeding, health care, production, till to the marketing of the product along

with the type of labour involved (child labour is not allowed), method of processing, inputs used in the farm and animal welfare measures taken which is a must for inspection purpose and certification of the farm and products as organic. Farmer should not be ignorant of this, in spite of his illiteracy and amazing memory, as it is a valuable tool for assessing the performance of one's herd or flock by the certifying agencies, which is mandatory for the milk to be labeled as 'organic'.

To bring a conventional farm to the organic status, the whole farm including dairy animals should be converted according to the standards set down (NPOP, 2002). The milk can be sold as organic only after the farm has been under conversion for at least 12 months, provided the organic production standards have been met for the appropriate time. Once conformity with organic standards has been verified by a certification body, the product is accorded organic label which carries the name of the certification body and the standards with which it complies. To the informed consumer, this label functions as a guide and an assurance of purity. Certification bodies evaluate operations according to different organic standards and can be formally recognized by more than one authoritative body. In India, currently 20 certification agencies are accredited by the Agricultural and Processed Food Products Export Development Authority (APEDA) for inspection and certification of the organic farm and its products.

Organic Piggery

Selection of Animals

There is very little research that addresses the suitability of breeds for the organic farming systems and there is no clear evidence that high intensity breeds can not be farmed successfully under organic management. In general, the breeds well adapted to local conditions ideally suit the organic production systems. But, the indigenous pigs are generally poor producers and so graded animals that are crossed with the exotic breeds suitable to the given agro-ecology are the required genotypes for starting an organic unit. The exotic gene pool that adapts well with the local environment without damaging it may also be used. Suitable exotic breeds like Landrace, Large White Yorkshire, Hampshire and Tamworth may be selected as per local environmental situations. The breeds, naturally resistant to locally prevalent diseases may be selected for organic production system. The crosses like T&D pigs are popular in some parts of the country especially among tribals. These aspects should also be taken into account while converting a pig farm to organic management.

Breeding

In the area of breeding, emphasis is given to maintaining a closed herd, the rearing of the herd's own replacements and the feeding of whole milk to young

(Lampkin and Measures 1995). For pig production systems, organic farmers frequently choose more robust or sometimes even rare breeds that are locally documented (*Ghungroo* in Tarai of West Bengal). However, the development of special breeding programmes for longevity would be beneficial.

Feeding

The conversion to organic management is likely to have some implications on the feeding regime, especially if the previous conventional system was to a large extent relying on external inputs. The aim in an organic farming system usually is to maximise the production from home grown feed resources. However, the standards do not exclude the use of ready mixed concentrates but place some restrictions on the components and the proportion of conventional feed. Alterations in the amount of concentrate use are dependent on its existing level; both increase and decrease are reported (Haggar and Padel 1996). There is little research available about the concentrate use in grazing livestock systems such as beef and sheep enterprise as well as in pastured pork production under organic management. Reduced concentrate feeding will lead to a higher demand in forage (in quantity as well as quality) so the planning of the forage supply of the farm needs some careful consideration.

Little is known about what types of concentrate are best suited to supplement the forage in order to maximise its utilisation. Currently the decision on what concentrate to feed is taken on grounds of availability and price. There also is some uncertainty on what other protein sources can be used in concentrate mixes, either on the farm or by commercial suppliers that fall within the standards. Feeding of pigs for weight gain in particular, under conventional systems has good documentation. But, the research is still inadequate for feeding of pigs under organic management. Thus, it's a good area of research for animal nutritionists and livestock production management researchers.

There is no clear evidence that the forage quality changes as a result of the conversion to organic farming (Kristensen *et al.* 1994, Veauthier and Krutzinna 1992). There is some evidence that the overall diet fed on organic farms is more diverse than on conventional farms, with a higher proportion of hay and root crops. The converting livestock farmers might then also be faced with the decision on what alternative crops can be grown on the farm to improve the diet and performance of the stock.

Indian farmers can benefit from the experiences of producers in United States or European countries. Feed manufactured for use in organic pork production can only contain ingredients from three categories:

- agricultural products that were produced and handled organically,
- non-synthetic substances such as enzymes, probiotics, and others usually thought of as natural ingredients, and

ANIMAL BREEDING, NUTRITION AND HOUSING MANAGEMENT IN ORGANIC PRODUCTION SYSTEM

- synthetic substances that appear on the national list of Synthetic Substances Allowed for Use in Organic Livestock Production. Some ingredient use limitations for organic diets include:
 - ◆ No genetically modified grain or grain by-products
 - ◆ No antibiotics, hormones, or drugs
 - ◆ No animal by-products
 - ◆ No grain by-products unless produced from certified organic crops
 - ◆ No chemically extracted feeds (such as solvent- extracted soybean meal)
 - ◆ No synthetic amino acids.

Housing Considerations

Organic standards contain detailed animal welfare provisions, which are an important component of successful organic management. Outside access and housing appropriate to behavioural needs are required. Research has found that the type of housing selected for pigs plays a major role in the health of the herd, influencing such things as social behavior, feeding and weight gain, and rates and degree of health problems. Group housing systems for pigs need to allow for social behavior and for avoiding unnecessary social stress. Pigs are very social animals and live in family groups in their natural environment. In these family groups, the sows establish their hierarchy ranking by age, size, and aggressiveness. Maintaining sows in individual family groupings throughout all stages of production minimizes confrontation, fighting, and the possibility of injury, which occurs if newcomers are continually introduced to the social circle, disrupting the hierarchy. Sows need at least a couple of weeks to establish social groups that have sufficient stability to provide support to members and reduce stress. Although frequent mixing of gilts resulted in the same amount of threatening behavior, the number of injury-causing fights could be significantly reduced by regrouping the gilts at least three times.

Sows have a strict social structure. The dominant sow can usually be found in a gatekeeper position, closest to the waterer or feeder. The most submissive will farrow in the farthest corner. Every other sow fits in between. Knowing something of the social ladder can help when deciding which sow of a twosome to move, and which to leave, should a problem arise. Providing sufficient watering and feeding space is necessary in all housing options.

The AHA Standards for Pigs set the following requirements for a feeding place (space required by a single pig while eating). When feeding ration to pigs in a trough, there must be 1.1 times the shoulder width for all of the pigs, so that they can feed together simultaneously. There must be no more than 6 pigs per feeding

place when using a dry feeder without full head barriers for each feeding place; 10 pigs per feeding place where there is a full head barrier; and 14 pigs per feeding space in wet and dry feeders (an additional waterer must also be supplied in the pen). There must be one drinking space provided for each 10 pigs, with the waterers adjusted in both height and flow rate to ensure that water is accessible for each pig.

Space Requirements

Most of the organic standards state that a producer must accommodate the health and natural behavior of the animals. It is assumed that detailed space requirements as per the climatic conditions, health of animals and comforts to them, would be developed by the respective certification bodies. The following minimum space requirements are based on Swedish experience, particularly experience with housing boars, gestation sows, and sows with litters in the Swedish Thorstensson and Ljungstrom versions of deep-bedded pig housing.

1. Boars: 64 sq. ft. per individual (74 sq. ft. if no separate dunging area provided);
2. Sow and litter in pens: pens with manure gutter: 54 sq. ft. exclusive of gutter per sow and litter; pens without manure gutter: 64 sq. ft. per sow and litter;
3. Sow and litter in boxes: 48 sq. ft. per sow and litter;
4. Sow and litter in group lactation housing: 81 sq. ft. per sow and litter;
5. Gestating and mating sows (individual housing in crates is prohibited; the following requirement is for group-housed sows): 27 sq. ft. per sow (exclusive of feeding area);
6. Weaned, growing and finishing pigs: Space shall be provided to allow all pigs to lie down in full lateral recumbency at the same time.

The AHA Standards for Pigs provide a table that lists the minimum bedded space allowance for growing pigs from 1.6 sq. ft. per 22-pound pig to 8.1 sq. ft. per 220-pound pig, with a minimum total floor space of 37.6 sq. ft. per adult sow. They state that pigs must always be provided with total floor space no less than 1.5 times the lying space (should at least be equal to the square of the length of the pig).

Access to Outdoors

Depending on how any particular regulations define access to outdoors, shade, shelter, exercise areas, fresh air, and direct sunlight for pigs, housing and production systems needs to be re-designed or modified to meet the requirements for certification. The requirements like a pasture lot, open dirt lot, or cemented area outside the various buildings for exercise; or a building with an open front and

back that allows sunlight and fresh air to enter be sufficient access to outdoors should be taken into consideration. If the requirements are defined so that access to outdoors means pens or lots outside buildings, these will have to be designed to prevent soil and water pollution through manure runoff. Pigs have a typical behaviour of poking their noses in the mud, known as rooting behaviour. The farmers should make provisions of water bodies or ponds, wherein they can perform their natural tendencies.

Health Management

Organic pig production offers a good opportunity for Indian producers, since it is an efficient feed converter and pork has an increasing demand. Moreover, it being a relatively new production concept, has promising possibilities for growth. Many consumers avoid pork just because they consider it a dirty animal since they have seen pigs eating garbage. Pigs can be raised under good hygienic conditions and consumers can be convinced that pigs are not as dirty as they have usually seen under poor raising conditions in impoverished production environment. A major challenge is to maintain and improve animal health and food safety without compromising animal welfare. Starting or conversion to organic production implies a change in animal health management, best characterised by a move away from therapeutical treatment to preventive management. This represents potentially the most difficult area for many farmers to comply with. Problems with animal health are, apart from soil erosion, one of the most frequently mentioned motivations for farmers to convert to organic methods (Fischer 1982, Vogtmann *et al.* 1993, Wernick and Lockeretz 1977). By improving the level of stockmanship within the organic herd or flock and improving the immunity of the animals to disease, many problems can either be prevented or detected in the early stages of development and effectively treated with alternative remedies without the need to routinely use conventional medicines. In many cases, the key issue during the conversion period is the confidence to stop routine medication, such as use of anti-helminthics, in favour of alternative approaches.

Detailed studies on the health situation of animals under organic management are rare and usually focus on dairy cows. However, some reports from Denmark, USA and UK show that there is some indication of lower incidence of metabolic diseases and lameness in organic herds. There appears to have been a slight improvement in fertility and age of the sow on the organic and in conversion holdings. Poor nutrition (structure, energy and protein supply) often underlies health problems and it has therefore been suggested that a recommendation for regular forage analysis should become part of organic standards (Ebbesvik and Loes 1994).

The situation is somewhat different on farms with sheep, beef and pig enterprise, where parasites are likely to represent the biggest challenge. The control of internal

parasites can be successfully achieved with management practices such as clean grazing systems, mixed stocking, rotational grazing and selection of resistant stock and breeds. A reduction in stocking rate will also have an effect in reducing the parasite burden of pastures. Drenching of particularly stressed and therefore more vulnerable animals such as sows with larger litters is considered to be acceptable. The situation is slightly more difficult with regard to the control of external parasites, where until now management practices are not so well developed and farmers have to resort to using conventional treatment on a more regular basis, or to comply with legal requirements. However, overall organic livestock farms appear not having major health problems, other than similar to conventional herds. The farmers use a combination of preventative management, good supervision for early detection and alternative treatment, especially the use of homeopathy and, in severe cases, the use of conventional veterinary treatment to maintain animal health.

Many problems concerning diseases, zoonoses (diseases that transfer from animals to humans), and animal welfare can probably be reduced by improved management in the production. Parasites are a major problem for animal health and welfare in many organic pig production systems. Knowledge relevant for parasite control is scarce. Rodents are an important risk factor for diseases and zoonoses in organic pig production systems. It is necessary to develop organic acceptable rodent control strategies. The ecology of the pest problem is to be investigated in organic pig farm cases, and strategies for controlling pest problems are to be developed.

Pigs are raised in India mostly in scavenging ways, eating garbage giving an awful look. Such types of production practices are not acceptable under organic management. Pigs deserve good treatment in matters related to feeding, housing and health care. Farmers need to be shown films and documentaries on the pig production in western countries, where, these animals are raised in good environment especially in organic systems.

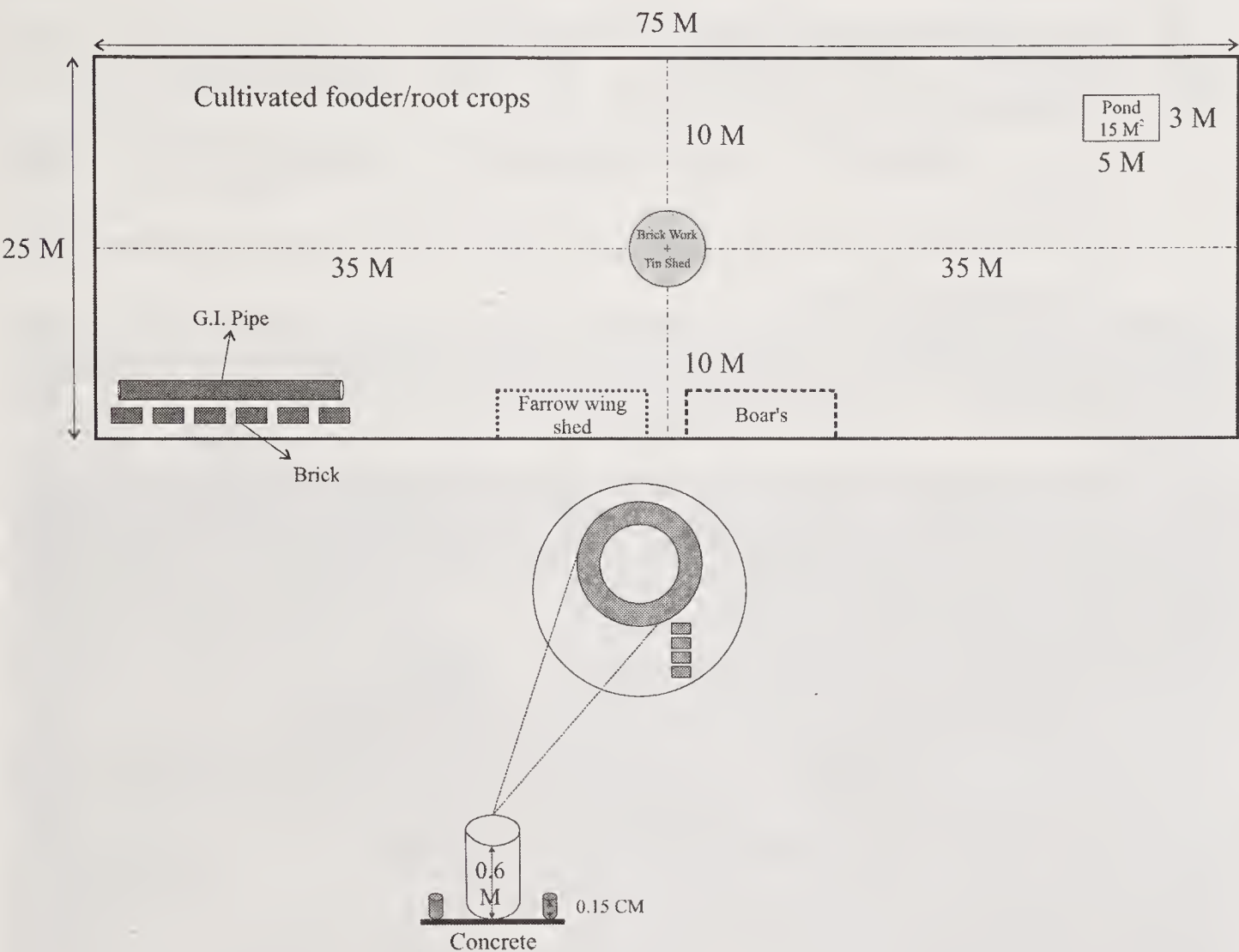
Setting up an Organic Pig Production Unit

Starting in small way is better, so 10 (9 female 1 male) pig unit can be handled well under Indian small scale conditions.

Breeding: Natural mating may be followed.

Feeding: Starting with conventional feeds, gradual replacement with fodder/natural feeds till the availability of total organic feeds and fodder. Pasture enriched with the FYM/vermi-compost. Addition of Essential Amino Acids (EAA) initially, then natural sources of EAA incorporation. Fodder cultivation-conventional and medicinal herbs. The feeding to be done as per the physiological status of the animals. In the long run, self sufficiency in feed and fodder is to be achieved on-farm, so that market dependence for inputs is reduced to the minimum.

Fig. 1: Layout of the organic pig production demonstration unit



Housing: Sheds to be erected to house the females and 1 boar separately as shown in the Fig. 1. In the selected site, one pond to be created for wallowing, rooting activity. The unit will have following features:



- i. Free range/extensive
- ii. Open area
- iii. Scavenging/pasturing, fodder growing area
- iv. Wallowing (3 m × 4 m × 1 m)
- v. Rooting
- vi. Night sheltering-individual shelter for boar (10 m²), farrowing sheds with 10 chambers (12 m²).

Health care: Using homeopathy and ayurvedic preparations except in emergency. Employing standard techniques as recommended under organic management.



General management: Initially conventional procedures, gradually moving to practices as per the standards for organic livestock production. Wastes to be utilized for manuring the plots. Sheds to be disinfected with organic agents like citronella etc.

Financial requirements: The proposed unit may cost Rs 5,23,800.

6

Conversion of a Livestock Farm to an Organic Livestock Farm



Breeds and Breeding

Organic farming prefers to the use of local, native and pure breeds though exotic or crossbreds too are acceptable. A choice of breed's account must be taken care of their capacity to adapt to local condition in terms of it's disease resistance, maintenance and adaptability. An organic farm in case of cattle, can maintain with local *desi* cattle who's genetic and production potential can be up-graded with bulls of good producing records, if necessary. Organic farmers should pay attention to fitness characteristics, persistence and forage intake potential when breeding or making genetic choices. In addition, measures that encourage high feed intake should be implemented as soon as possible when raising heifers. Since profitability increases with high lifetime performance, longevity is an important characteristic, and should have first priority when making genetic choices. In this manner, it is possible to attain a sufficient farm income even at relatively low performance levels. Organic farmers may judge the productivity of an animal by different criteria than the

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conventional farmer. The animal's production record is important, but there are other characteristics which are equally important for adaptation to an organic environment such as mothering ability, hardiness and thriftiness, resistance to disease and parasites, and ability to forage.

Good animal welfare on the farm starts with the choice of a breed, with low incidence of genetically determined welfare problems. Selection of a suitable breed adds to the efforts of a farmer to improve animal welfare on his farm. On-farm selection for those characteristics that optimally fit the local farm production conditions (family breeding) has to be realized by the farmer. The breeding goals of conventional farming systems, which have been exclusively directed towards increased production efficiency, have most often resulted in animals that will not be able to profit from welfare friendly housing conditions and management procedures (for instance, high milk yield in cows associated with increased incidence of production diseases).



Tharparkar cattle breed: disease resistant & stress tolerant

Organic farmers are more likely to maintain livestock for lifetime yield and longevity. Studies show that heifers, selected for high first lactation yields and bred early, often have inferior production after the second lactation when compared to later maturing cows. Culling rates are also higher. Longevity within the herd also promotes a more stable social order and more a stable state of health since more

animals are adapted to the conditions. Older cows can also help increase the vigour of the herd because the quality and quantity of colostrum increases with age, which gives added protection to their calves. Selection by the farmers for useful traits is also a viable option for some genetically determined characteristics. Resistance to parasites is one example. Studies from New Zealand show that the use of resistant rams with non-resistant ewes increased growth rates in the lambs compared with lambs from non-resistant rams.

India is enriched with an enormous bovine population having 26 native cattle breeds (10% of world) and all the breeds of riverine buffaloes (8 breeds). The indigenous livestock and poultry species specifically cattle and buffaloes in India deserve attention in a sense that these are ideal for organic system. The health care requirement of Indian cattle and buffaloes is one of the lowest in the world, owing to high disease resistance. Health signifies the most important sign of successful organic animal husbandry and all other aspects such as profit, fertility, growth rate, milk yield and feed conversion are related to the animal's health. Moreover, the indigenous technical knowledge and practices followed by Indian farmers makes them more suitable to organic livestock farming. The indigenous technical knowledge can be properly documented, tested, validated, so as to apply in organic livestock production.



Murrah buffaloes: known for milk and meat

Indigenous Cattle in Organic Farming

Bos indicus or Zebu cattle breeds which are the humped cattle, found in the Indian sub-continent are thought to be the world's oldest domesticated cattle. Cow has been a cornerstone of Indian agriculture for centuries and has served as source of nutrition for farming families through milk and milk products, as well as providing draught animal power for both agricultural operations such as ploughing and tilling the land, as well as for transportation of goods. Nearly all basic necessities of life were woven around the cow, with contributions in all aspects of life, including farming and manure, food and nourishment, transport, fuel (burning of dried cow dung cakes) and medicinal usage of cow dung and cow urine.

The cattle biodiversity present in India is unparalleled in the world, encompassing a wide spectrum of breeds of indigenous cattle which are elaborately allied with social, cultural and traditional values of the diversified geographical areas of the country and its inhabitants. Cow has been deemed very holy in Indian culture and any assistance presented to them is regarded as heavenly. As a salutation of gratefulness, cow has been adored as 'Gomata' (mother cow) in India since ancient times. During recent past when emphasis shifted from the absolute contributions of cows to milk production only, the indigenous cattle got marginalized due to their low milk productivity. However, the crossbreeding (cross species- *Bos indicus* × *Bos taurus*) of indigenous cattle with exotic cattle have not found much favour with farmers due to the associated problems of health, reproductive failures, nutrition and other sophisticated requirements. This is also evident from the fact that inspite of the sustained cross breeding efforts since 1960s, the crossbred cattle population has remained below 15% in India with huge regional imbalances. As a consequence, significance has again shifted towards indigenous cattle breeds which have not been exploited to their full potential. The organic livestock farming may further revive interest in indigenous breeds leading to the improvement and conservation of local breeds.

As per the livestock census of 2003, India has 18.5 crore cattle population, which registered a decrease of about 7.0% from that of 1997 livestock census. Majority of this belong to indigenous cattle (87%). There had been radical changes within cattle population over the last couple of years indicating a shift in the priority of the farmers from bullock production to milk production. India ranks first in milk production; forty percent of which comes from cows including 22% from indigenous and 18% from crossbred or exotic cows. In spite of all unfavourable circumstances, indigenous cattle contribute immensely in the economy of country through milk, draught, urine, dung, bones, hides, horns etc. There are 26 well defined breeds of cattle in India apart from several other undefined populations in different parts of the country. Recognized breeds represents about 20% of the total cattle population. These are classified into 4 categories as per their utility in Indian socio-economic conditions.

1. **Milch Breeds:** Sahiwal, Gir, Rathi and Red Sindhi.
2. **Draft:** Amritmahal, Bachaur, Bargur, Dangi, Hallikar, Kangayam, Kenkat, Kherigarh, Khillari, Malvi, Nagori, Nimari, Ponwar, Umblachery, Red Kandhari and Siri.
3. **Dual Purpose:** Deoni, Gaolao, Haryana, Kankrej, Krishnavalley, Mewati, Ongole and Tharparkar.
4. **Dwarf Cattle:** Vechur, Punganur and Badri Cow (Red hill cattle of Uttarakhand).

Table 1. Population of crossbred and indigenous cattle in India (2003)

States/ UTs	Cattle population (in thousands)		
	Indigenous	Crossbred	Total
Andhra Pradesh	8 193	1 107	9 300
Arunachal Pradesh	445	13	458
Assam	7 999	440	8 439
Bihar	9 455	1 274	10 729
Chhatisgarh	8 629	253	8 882
Goa	63	12	75
Gujarat	6 785	639	7 424
Haryana	967	573	1 540
Himachal Pradesh	1 559	677	2 236
Jammu & Kashmir	1 764	1 320	3 084
Jharkhand	7 513	145	7 658
Karnataka	7 936	1 602	9 539
Kerala	387	1 735	2 122
Madhya Pradesh	18 595	317	18 913
Maharashtra	13 527	2 776	16 303
Manipur	349	69	418
Meghalaya	744	23	767
Mizoram	27	9	36
Nagaland	208	243	451
Orissa	12 840	1 063	13 903
Punjab	508	1 531	2 039
Rajasthan	10 390	464	10 854
Sikkim	79	80	159
Tamil Nadu	4 001	5 140	9 141
Tripura	702	57	759

Contd...

Table 1. Concluded

Uttar Pradesh	16 917	1 634	18 551
Uttarakhand	1 961	228	2 188
West Bengal	17 794	1 119	18 913
Aandman Nicobar	51	13	64
Chandigarh	1	5	6
Dadar & Nagar Haveli	49	1	50
Daman & Diu	4	0	4
Delhi	34	58	92
Lakshadweep	2	2	4
Pondicherry	16	63	78
All India	160 494	24 685	185 179

These breeds of cattle are the result of thousands of years of selection, evolution and development in the process of domestication suitable to the local agro-climatic conditions. Milch breeds like *Sahiwal*, *Red Sindhi*, *Gir* and *Rathi* are high milk producers while majority of other cattle breeds belong to draught or dual purpose category providing small/ good amount of milk besides good quality bullocks for draught and other purposes in agriculture. These native breeds exhibit a distinct superiority in utilizing poor quality feed and are adapted to withstand heat and show better resistance to tropical diseases. The advantages of exotic breeds or crossbreds may be seen only in a few pockets with favourable conditions like irrigation; the vast areas of rural India still depend on indigenous cattle for milk, manure and draught. Even where crossbreds are prominent, carting and ploughing is done by the bullocks of indigenous breeds.

Conservation of Indian Cattle for Organic Farming

- India is a hot spot of ecological, genetic and species biodiversity.
- India possess 6.13 % of the total biodiversity of the world.
- As per FAO (2007) approximately 3.3 per cent of total domesticated livestock biodiversity exists in this part of the world.
- After characterization of all the available populations of domestic livestock and poultry, share of India will be much higher.

Considering the principles and guidelines of organic livestock production, indigenous breeds of livestock are ideal worth paying attention. Moreover, the

conservation of indigenous animal genetic resources is deemed to be essential in the light of the rapid loss of native breeds either through crossbreeding (using indigenous bull through back crossing) or direct replacement with exotic breeds. In this regard following points need attention:

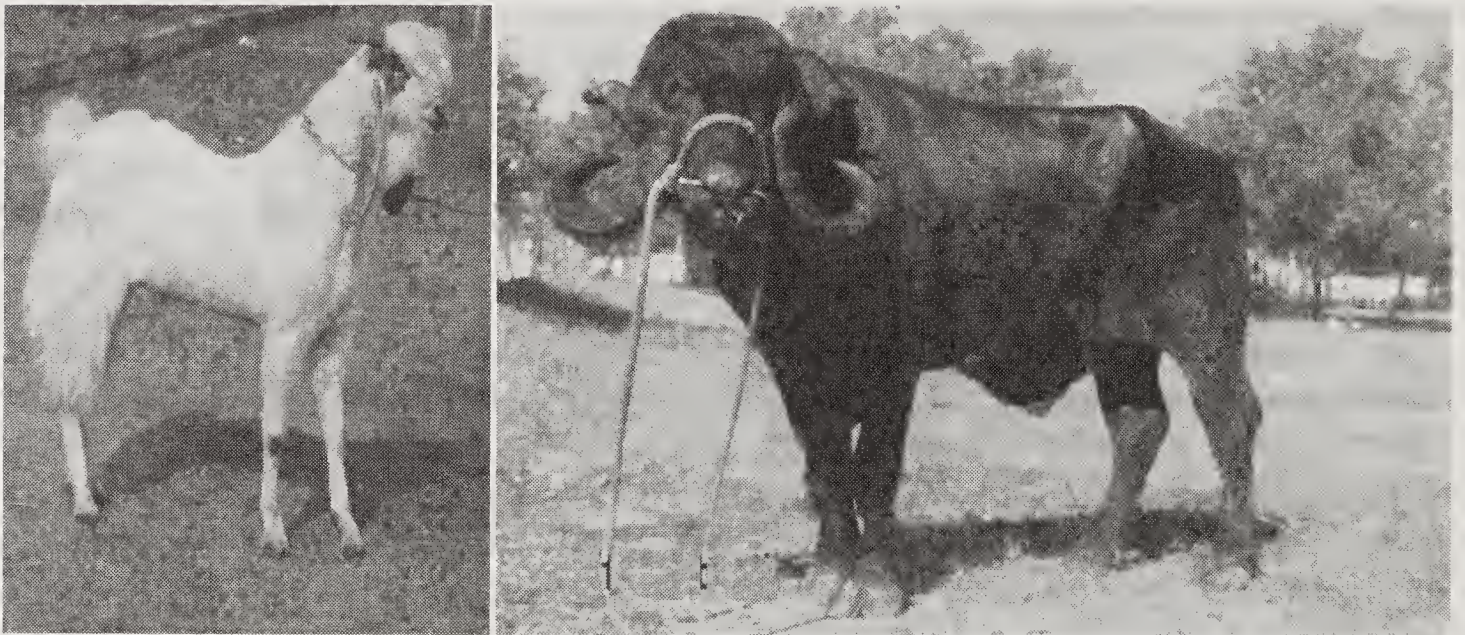
- No organized effort has been made to improve the genetic potential of indigenous breeds. So the actual worth of these breeds is not known so far.
- Crossbreds are more milk producer as compared to indigenous under favourable environments but their tendency to wilt under Indian conditions of low input and harsh climate, susceptibility to tropical diseases, drop in production levels beyond F1's etc. warrants the conservation of indigenous breeds for future use.
- Non-renewable sources of energy are bound to exhaust sooner or later. If this does happen, we may have to fall back on animal wealth for providing draught power and hence we cannot take risk of letting these breeds go extinct. Moreover in small holdings, mechanization is either not possible or it is not cost-effective. In this situation, dependence on indigenous breeds would further increase.
- Conservation of indigenous cattle for their products, e.g. urine, dung as these possess medicinal properties and can be utilized for treatment of various human ailments.
- For organic farming, the conservation of indigenous cattle is essential as their dung and urine are utilized as organic manure and biopesticide, respectively.
- 70-80 percent population of different indigenous livestock species is still non-descript.
- Large number of strains/local populations within breeds not yet recognized.
- Density of unproductive or less protective animals is increasing per unit of area.
- Marked decline in number of elite producers in Indian milch breeds like *Sahiwal*, *Red Sindhi*, *Tharparkar*, *Gir*.
- Breed-wise census figures are not available.
- Socio-economic studies on different breeds are lacking.

Threats to Genetic Diversity of Livestock

- There are about 6,400 breeds of livestock in worldover. FAO warns that out of these livestock breeds, around one third are in danger of extinction or already extinct.

ORGANIC LIVESTOCK FARMING

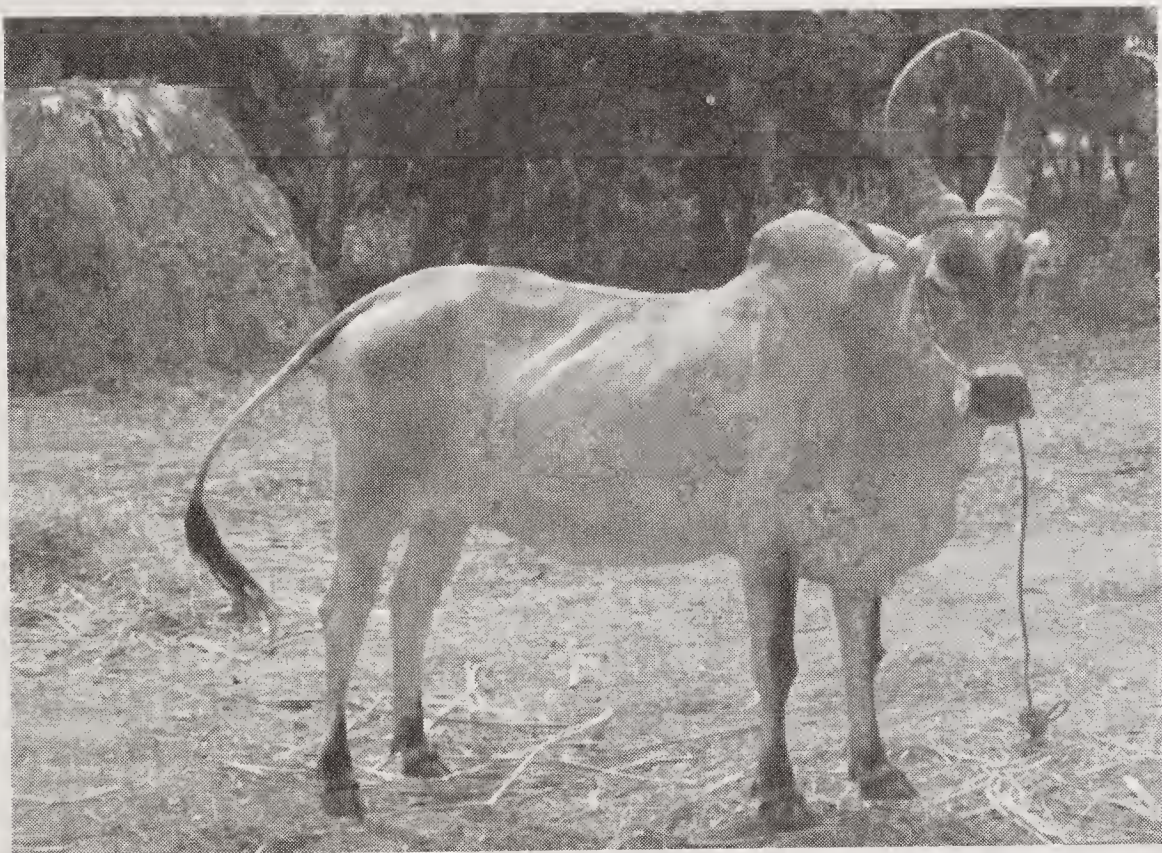
- FAO estimates that every week the world loses two breeds of its valuable domestic animal diversity.
- Marginalization of traditional production system and utilizing a narrow range of breeds for maximizing livestock production.
- Limited number of high output breeds are choice of farmer for increasing profitability to meet out increasing demand of fast growing human population.
- In case of small geographically concentrated breed population, the threats are major disease epidemics and disasters like drought, flood etc., e.g. Tharparkar cattle are facing such threat resulting into shrinkage of population size.



Diversity in livestock: Favorable for organic livestock farming



CONVERSION OF A LIVESTOCK FARM TO AN ORGANIC LIVESTOCK FARM



- The agro-biological resources are declining. Crop variety, crop rotation, crop ecology and crop management are changing very fast.
- The government policies and subsidies often support large scale production rather than small holder system utilizing local genetic resources.
- Fast increasing human population causing increasing demands of food, decreasing area cultivated for fodder crops and shrinkage of grazing land.

Contribution of Indian Cattle Breeds to Meat Industry in America

The native livestock breeds exhibit a distinct superiority in utilizing poor quality feed and are adapted to withstand heat and show better resistance to tropical diseases. American people especially those dealing with cattle breeding knew very well the worth and contribution of Indian cattle breeds to the growth of meat industry in these countries. For example, the introduction of the heat and parasite tolerant Zebu (humped) cattle imported from India during the second half of the 1800s contributed to a marked increase in beef production in the hotter and more humid regions of the USA (Sanders 1980). Indian cattle breeds, viz. *Ongole*, *Khillar*, *Gir* and *Kankrej* shipped to South American countries like Brazil when introduced and used to further develop the cattle suited to specific environmental conditions or market requirements have done remarkably well in these countries. American Brahman cattle were the first breed of beef cattle developed in the United States in the early 1900s as a result of crossing four different Indian cattle breeds (*Gir*, *Gujarat*, *Nelore* and *Krishna Valley*). The original American Brahman cattle originated from a nucleus of approximately 266 bulls and 22 females of several *Bos indicus* (cattle of India) types imported into the United States between 1854 and 1926. The Brahman is mainly used for breeding and the meat industry; it has been crossbred extensively with *Bos taurus* (European) beef breeds of cattle. The Brahman is one of the most popular breeds of cattle intended for meat processing and is widely used in Argentina, Brazil, United States, Colombia and northern Australia. It has also been used to develop numerous other U.S. beef breeds including Brangus, Beefmaster, Simbrah, and Santa Gertrudis (Tonts *et al.* 2010). The organic livestock farming may help revive interest in Indian native breeds within India too.

Nutrition and Feeding

Livestock require good diet for efficient production of the intended products, growth and maintenance. Organic livestock farming is primarily based on home-grown feedstuffs with the objective of establishing an almost complete on farm nutrient cycle, as per the basic standards of IFOAM (2006). Therefore, the most important principle of animal nutrition during organic livestock farming is that animals should be fed in an environment friendly way suited to their physiology. It

is important that the feed rations meet the nutritional and dietary requirements of the species and ruminants have access to roughage. Under the scarcity conditions and emergencies, non-organic feed can be fed, but such use of non-organic feed should be specified, is strictly limited to non-accessibility of organic feed and should be used only for limited period. Use of vitamins, trace elements and supplements should be from natural sources unless they are not available in sufficient quantity and/ or quality. Practices like feeding, a. slaughter waste to ruminants; b. slaughter products of the same species; c. all types of excrements; d. any product subjected to solvent extraction (e.g. hexane) or the addition of other chemical agents; synthetic amino-acid and amino acid isolates; f. urea and other synthetic nitrogen compounds; g. synthetic growth promoters or stimulants; h. synthetic appetizers, preservatives and colouring agents are prohibited.

Anyone interested to convert his farm to organic from conventional should have a detailed idea about the nutritional and feeding aspects relating to the species he is going to raise organically at his farm. The first step would be to go through the national standards of organic farming which often contain details about the conversion requirements and guidelines for organic animal husbandry. If s/he intends to market his product as organic labeled, s/he will have to get his production system certified by the accredited certification agency. For instance, in case of India, such farmer would have to contact APEDA accredited certification agencies for the details of the requirement and certification procedures, well in advance. In consultation with the certification agency, the farmer can develop his feeding, housing and animal health plan. Some general requirements are discussed as an indication of feeding strategies under organic management of livestock.



Feeding Organic Livestock

- The general principle of livestock feeding in organic systems is that animals have to be fed species-specific diet in a way suited to their physiology (e.g. dry matter of ruminant diet to contain a maximum of 40% concentrates; weaning of piglets not earlier than six weeks of age).
- Grazing should be maximized and supplementation of minerals, trace elements and vitamins is permitted when the requirement cannot be met by husbandry practices.



Grazing is one essential requirement under organic management of livestock

- As a rule, 80% of feed should be from organic sources, however, at times of difficulties and emergencies feed from conventional farms may be given with a dry matter content of 15% which has to be gradually reduced to 10% within 5 years.
- When formulating rations, diet of animal should be balanced by adjusting the protein percentage to complement the forage levels. For example, when rations are based on high protein forage, care should be taken to ensure that energy levels are met by straw or hay to balance the excess protein.
- Nutrient supply must be based on the animal's requirements in order to avoid metabolic disturbances, and to maintain fertility and overall health.
- The energy supply in organic agriculture could not be met through the use of higher amounts of concentrates (maximum of 40% in the daily ration); hence, in organic agriculture, forage quality plays a major role when milk performance potentials are high. Low forage quality causes the concentrate requirements to increase significantly.
- Concentrate components with a high NDF content (low energy) and those with high crude fat contents should be kept to a minimum (<20%).
- Supplementation with protein-rich concentrates is necessary in the moderate performance range mainly to fulfill the nitrogen requirements of the rumen microbes.
- Energy requirement can be met through concentrate components like grain. Protein concentrate components with low protein degradability and high

***"Animals have to be fed
species specific diet"***

energy content would be necessary in early lactation and for high performance.

- Greatest attention must be paid to the quality of the component (free from weed content, mould or mildew).
- The incorporation of legumes into farming systems provide many beneficial effects and play a key role in the management and sustainability of small ruminant organic livestock systems.

As ruminants have the unique ability to utilize roughages, different standards have stipulated the amount of roughages to be given to the ruminants. For example, Soil Association in UK stipulates that forage should account for at least 60% of dry matter in the ruminant diet. To prevent interference with fiber digestion, grain feeding levels should not be more than 0.3 to 0.5 % of the body weight. The amount of concentrates is limited, about 1200 kg/year, whereas, on conventional farms cows are fed about 2000 kg of concentrates a year. The concentrate feeding is already very low in Indian subsistence production systems. It is important to balance diet in terms of protein and starch ratio when formulating rations. As an illustration, feeding practices ideal under organic management for some prominent animal species are indicated as under:

Cattle

- Grazing as a practice is on the decline in India but it is encouraged under organic management systems of livestock production. Rotational grazing is of best choice to maximize grazing, lengthen the grazing season, and to reduce cost.
- Fiber plays an important role and rations should be designed with conditioning of the cow as first priority.
- In organic farming, the ration for dairy cattle during the housing period mainly consists of grass silage/hey as per the local availability and practice. Organic dairy cows have to be given some concentrates in order to fulfill the genetic potential for milk production, even if they are fed high quality silage.
- With well-balanced rations, high nitrogen efficiency is possible in organic dairy farming. At a performance level of 4,000 kg, no concentrate is required for the ration type high-quality grass and corn silage. For high quality grass, the requirement is less than 2 kg per day (DM basis), whereas, in case of low quality forage, up to 4 kg concentrates per day (DM basis) are necessary.
- At a performance potential of 6,000 kg, 40% concentrates are needed at the beginning of lactation if the forage quality is low.

- To supplement the feed of animals, plant based products, by-products of food industry like molasses, fodder preservatives like bacteria, fungal and enzymatic elements, vitamins, trace elements can be added as per requirement.
- Raising of calf is more important, as it is the future organic milch animal. Calf be allowed to suckle according to its natural requirement and proper weaning be done unlike in conventional systems. In case of emergencies, calf may be given milk from non-organic farming systems or dairy substitutes so long they don't contain antibiotics and synthetic additives.

Poultry

- The largest component of any organic poultry diet will be cereal. Home grown proteins like peas, beans, and rapeseed can be used, of which, peas offer the most scope.
- With careful treatment and formulation, it may be possible to include peas in organic poultry rations at inclusions of between 250 and 300 g/kg for table chickens and 150 to 200 g/kg for laying hens.
- Oily fish meal is allowed in organic rations and it has higher essential amino acid content than full fat soya. Its use in poultry rations is limited partly by cost, by restrictions on the source of the fish, by the fact that some customers require the birds to be fed on a vegetable based diet and also by concerns about fishy taints to the product.
- As the chicken's digestive system is made to handle insects, seeds and grain rather than forage, concentrated feed rations are required, if the birds are to produce at required level.
- High quality roughages, particularly legumes can contribute to the diet.
- All ingredients must be certified organic, except for vitamin and mineral supplements making up not more than 5% of the diet. Vitamins and minerals are an important part of the diet, and are traditionally added and mixed into the feed. However, birds on range consume plants and earth rich in vitamins and minerals. Sprouted grains are a good source of vitamins and can be used to replace synthetic amino acids. Limestone and phosphate rock can be used as mineral source. For layers, limestone grit and oyster shell will provide the needed calcium for egg production.
- Clean air, deep litter, clean water, access to outdoors and balanced rations are key factors for sound healthy birds. Overfeeding must be avoided.
- Use of synthetic amino acids in poultry diet in organic production systems is prohibited. Essential amino acids can be met through feeding of organic soyabean, skim milk powder, potato protein, maize gluten, finger millets (Ragi) etc.



Pastured poultry is appreciated under organic systems

Organic chickens are no different from any others when it comes to their requirement for amino acids. Poultry require amino acids for both maintenance and for growth. The proportion of the amino acid supply, which the bird's metabolism will allocate for each purpose, will depend on a number of factors. Some of these factors will be the same for organic poultry as for non-organic, while others may differ. All other things being equal, if environmental constraints placed upon the organic chicken are equivalent to those affecting non-organic birds, the bird's maintenance requirement will be similar. If the bird's diet is deficient in a specific component, a "hunger" for that component can arise. In case of methionine, for example, there is circumstantial evidence that birds may peck each other's feathers in search of amino acids when it is deficient in the diet. This in turn presets a welfare problem. Indigenous natural sources of methionine needs to be tested and used. For example, finger millet (*ragi*) is fed to poultry by tribal and other backyard poultry farmers in some parts of India. This can be researched, if it can effectively meet the requirement of poultry, since synthetic sources of methionine are restricted under organic systems.

Pigs

- Nutrient-environment inter-actions play an important role in regulating feed intake and hence daily growth rate.

- Piglets have to be fed with natural milk for at least 40 days. Pigs require amino acids for maintenance, growth, reproduction and locomotion.

***"Self sufficiency is an aim of
Organic Farming"***

- Organic pigs are required to be provided large amounts of roughage. The conversion of this roughage into useful nutrients may be dependant on individual physiological characteristics.
- Self-sufficiency is an aim of organic farming. Home grown forages will be an alternate to the use of high-density cereal based diets. In outdoor reared stock, the pasture itself is a source of forage. Pigs may be observed to spend long periods of grazing, as well as rooting pasture.





Pigs outdoor enjoy natural life under organic systems

- Purchased conventional feedstuff are limited to 20% in relation to the total amount of dry matter feed intake. Additionally roughage should be provided daily.
- Potato protein provides a valuable protein concentrate and, therefore, it is often used as a supplementary source for amino acids in organic pig production. For piglets, milk is the best available source of amino acids, providing a high digestibility. The exclusion of synthetic amino acids and chemically solved soybean meal can be compensated for, by other protein sources like skim milk powder, potato protein, finger millets or rape cake. While grain legumes provide a disadvantage in the feeding of sows and piglets due to the low content of limiting amino acids, there seems to be an advantage in the case of fattening pigs in relation to meat quality. In diets for fattening pigs, the avoidance of supplementation with limiting amino acids favours the production of meat with high intramuscular fat without causing an overly fat pig.

Where From the Feed Should Come From?

In conventional system, it is common practice to purchase feed for animals, whereas, in organic production system farm itself should meet its requirements. To make the system work economically, environmentally and philosophically, the

emphasis should be on maximizing production of feed stuffs on the farm. In fact, for organic livestock producers, the route of success is self-sufficiency in feed production. If that is not possible, the development of a regional system where animal feed is produced by neighbouring organic farmers should be encouraged. Different standards like IFOAM basic standards and Indian standards stipulated that 50% of feed should come from the farm itself. Feeding of young mammals should be based on natural milk, preferably from the same species. Where this is not available, organic milk powder would be the second preference. In the absence of any other sources, organically produced milk replacer, and as an emergency measure conventionally produced milk replacer (without antibiotics) may be used.

In case of difficulties in procuring organically grown feed, some percentage of feed can be met with conventional feed, is the allowance being given by certification programmes. According to Indian standards, the maximum percentage of such feed shall be calculated in terms of the average diet for each animal category (*See Draft National Standards of India*).

In organic agriculture some substances are prohibited for inclusion in animal feeds (*See National Draft Standards of India*)

Feed supplements: Though grazing substantially meet the mineral requirements, but sometimes supplementation of minerals and vitamins is a must. Requirement of vitamins and minerals can be met through natural sources like sprouted grains, brewer's yeast, molasses and rock powders. However, almost all standards state that, any source of feed salt is acceptable. Access to clean and fresh water is utmost important. Though the Indian standards are not clear in this regard but some standards like Canadian standards stipulated the nitrate level in water, which must be below 10 mg/liter.

Young stock from mammals shall be raised using systems that rely on organic milk, preferably from their own species. The accreditation programme shall set minimum weaning times taking into account the natural behavior of the relevant animal species. In emergencies, the accredited certification programme shall allow the use of milk from non-organic sources or dairy based milk substitutes so long as they don't contain antibiotics or synthetic additives. The use of probiotics, however, is allowed by most of the standards.

Feed and Fodder Quality Assurance

The quality of livestock feed and forage and their potential impact on human health with the growing and harvest of feedstuff in the farmers' field and/ or the

grazing of animals have important considerations under organic management. Ingredient specifications are important factor for quality assurance in defining the quality of the feedstuffs. In India, organic livestock sector is yet to make a mark but Indian organic agricultural products have made their presence felt at the world level. Organic agriculture products, like tea, spices etc. are being exported increasingly from India to many countries. However, a lot is required to be done in future in the area of feed and fodder production for organic livestock farming. Efforts are underway to assess possible difference in the nutrient contents of organic crops with that of similar chemically grown crops? Consumer would always prefer a food item, which has higher nutrient levels as well as lower levels of anti nutritional substances.

The quality assurance is an important aspect in organic production. Therefore, the certification agencies and potential buyers of organic products give top priority to quality assurance.

The key elements in effective quality assurance are:

- Inspection and sampling of feed ingredients
- Laboratory testing and microscopy of feed
- On farm quality control
- Control of drug use
- Farm sanitation and integrated pest management
- Water testing
- Farm cleanliness
- Proper feed storage

The increasing use of alternative therapies that rely on organically grown foods has renewed interest in the relationship between agricultural methods and food quality. Worthington (1998) reviewed the literature over a period of 50 years comparing the nutritional quality of organic crops with conventional crops. He observed a trend in the data indicating higher nutrient content in organically grown crops. Research study reported by him showed better growth and reproduction in animals fed organically grown feed compared with those fed conventionally grown feed. The nutrients considered for the study were iron, calcium, phosphorus, sodium, potassium, magnesium, Vitamin C and β - carotene. He observed that organic crops contained about 23, 17, 31, 12.5, 20, 14 and 24 % higher levels of Vitamin C, iron, calcium, phosphorus, sodium, potassium, and magnesium, respectively, compared to a similar chemically grown crop. Other toxic substances like, nitrate were found to be about 34 % less in the organic crops as compared to chemically grown crop. He however, concluded that further research is required to confirm the trends seen

in the existing data and to clarify the exact relationships between agricultural management and nutritional quality. This could be an interesting area for animal nutrition researchers or food scientists to compare the food, feed and fodder quality under different production systems.

Health Care of Organically Fed Animals

On an organic farm the focus is on livestock management that prevents health problems by taking holistic approach, recognizing that disease. Nutrition often helps to keep balance between health and disease. Several animal studies conducted comparing organic feeds with chemically grown feeds showed that organically fed animals had less illness, better testes condition and greater sperm motility in males, better egg production in poultry, and better fertility in females, less stillbirths and prenatal deaths and better survival rates of young ones. These results are indicators of health status and clearly indicate that the organic feed has some better health benefits. It was further significant to note that all of the biodynamically fed animals performed excellently compared to chemically grown crop fed animals (Worthington 1998). Some studies indicate that organic feeds are superior to the chemically grown feeds, thus, positively contributes to the health of animals. This, however, is a matter of further systematic studies to arrive at more acceptable conclusions.

Scope of Organic Feed and Fodder

Large tracks of land in India are already cultivated with very low use of agrochemicals, and traditional production systems adopted by farmers for many perennial crops have been, by and large, without any use of fertilizers and pesticides. Although yields in these areas are low and production is principally for subsistence, there exists great scope for organic feeds and fodder. Work carried out at different universities and institutions suggests that the productivity in these areas could be improved further by adoption of organic techniques, for example, organic manure and biopesticides, NADEP compost, biogas slurry, farmyard manure. There is growing appreciation for organically grown feed, especially as it provides additional value to production. However, there are a number of challenges as listed below, that India and its organic community are likely to face:

- Awareness needs to be raised amongst producers, processors and consumers regarding organic feeds and fodder and the potential of domestic and export markets for organic products.
- Domestic markets need to be developed and supported, and the role of NGOs must be encouraged.
- A holistic approach for organic feeds and fodder needs to be encouraged at the level of farmers, as also at research institutes and universities.

- Local certification should be developed and a database on organic livestock farming and marketing of produce should be initiated and maintained.

Organic farming systems aim at growing and producing most of the animal feeds in the farm to enable sustainable production and minimize the risk of contamination of these feeds by chemicals which may be in use at other sources where from such feeds may be procured. Farm production of animal feeds also promotes the achieving of the basic objective of organic farming which is use of low external inputs.

Tips for Good Feeding

It is important that the daily ration for all farm animals should contain an average of 70% carbohydrates, 25% proteins and 5% vitamins, minerals and oils. The farmers should keep in mind following points while feeding their animals:

- Ensure easy access to feed and water to encourage intake.
- Offer a wide variety of foods daily to meet nutrients need.
- Provide forage and water at all times to increase production.
- Limit the intake of concentrates for ruminants to prevent metabolic disease, e.g acidosis.
- Supplement the animals' diet with feed sources that are rich in mineral and vitamins to protect the animals from diseases.
- In the grazing areas, practice proper stocking rate to avoid destroying the environment through overgrazing.
- Allow time for regeneration of pasture by having short grazing periods followed by period of rest.
- Fire should not be used for bush clearing as it leads to loss of a wide variety of protein rich and medicinal plant that help balance the animals' diet.
- Trees and shrubs should be preserved so as to provide shade, other trees like *Acacia* species drop protein rich pods that benefit ruminants directly.

Finally, as mentioned earlier, a review of the literature by Worthington (1998) stated that animals fed organically grown feed showed better growth and reproduction than animals fed conventionally grown feed.

Livestock Housing Requirement under Organic Farming System

The basic objectives of providing housing to the animals produced and maintained organically are having two fundamental components – (1) opportunity for performance of normal behaviour of the animal based on species, status and

environment and (2) the animals' physiological parameters must lie within the normal range. These factors are responsible for the sound welfare of the animals. In order to achieve these housing objectives, the certifying agency should ensure the following:

1. Sufficient space for free movement of animals.
2. Sufficient fresh air, natural day light as per the need of animals.
3. Protection against excessive sunlight, heat, cold and rain.
4. Sufficient dry and non-slippery lying and resting area.
5. Adequate space and facility for expressing the normal behaviour of animals according to their physiological and ethological needs.
6. Adequate feeding and watering space with proper design and material.
7. Corners, turnings, channels and gutters etc. should be designed so that they may not injure the animals.
8. Animals should not be subjected to distress and fear due to improper environment and material of housing.

Housing Standards for Organic Animal Husbandry

In India, there are yet no approved housing standards laid down for organic animal husbandry for various categories and age group of animals. It is imperative that the housing standards for various livestock are developed and approved region and category-wise, in accordance to the broad guidelines and standards set for organic animal husbandry. Keeping in view the welfare issues, the various housing structures are being mentioned as under-

Floor Condition

The floor of the house for cattle, buffalo, sheep, goat and swine should be smooth but non-slippery, impervious but not very hard. A slippery or wet floor alters the moving behaviour and also creates distress in animals and results in poor welfare and poor production also. On a wet floor animals do not sit, lie down and sleep comfortably and normally. The smooth and impervious floor can easily be washed and cleaned and does not give any opportunity for multiplication of microbes (pathogenic and non-pathogenic) and, thus, the use of chemical sanitizers/ insecticides can be avoided and also the quality of the product (milk or meat) will be of good quality and free from chemical residues. The broken floor is a good source of development of ectoparasites.

Floor Slope

Proper slope in standing area, paddock and channels is necessary for proper drainage of urine and washings in order to keep the housing dry and comfortable. The slopes generally accepted for good welfare of animals are mentioned below:

- a) standing area : one in forty
- b) open paddock : one in sixty

Materials to be Used

The standing area should be made of CC, morum, stones or wooden planks based on region-wise availability and cost. The open area or paddock or run should be made of brick on edge, stone or moram depending on cost and availability. The standing area and paddock should be impervious and smooth. If it is made of CC it should not be cement polished, rather it should be rough.

Floor Space Allowance

The size of the standing floor depends on the size of animals. A range of the floor space requirement for different species is mentioned in Table 1. Space required for crossbred cows should be similar to that of buffaloes.

Feeding Trough (Manger)

The feeding trough is essential part of housing for offering roughage and concentrate. For convenient feeding the manger should be continuous type. The dimensions of feeding trough for different categories of livestock are mentioned in Table 2. The materials for constructing feeding trough may be RCC, CC, brick mortar, wooden planks, stones etc. depending upon the availability of material and its cost. The bottom of the trough should be rounded and slopy as in Figure 1, so that it can be cleaned and washed and drained through drain holes provided at the distance of 3 m. The top of inner edge must be rounded and if made of brick, it should be metal topped.

Paddock

The open area required by the animals is mentioned in Table 1. It should be made of brick on edge and the joints should be sealed by cement-sand mixture with 1:60 slope towards drain. In high rainfall area, a raised and covered by CGI sheet

or asbestos sheet plate-form should be provided as resting area in the open area. This space should be length of animal \times chest girth \times 2 for each animal.

Gutter

The gutter should be of 30-40 cm width and having 1:40 slope. The depth should be maximum 15 cm. The corner should be rounded and surface should be cement polished. It should be made of CC. The slotted covered catch pits should be provided at appropriate distance.

Water Trough

The length of water trough should be $1/10^{\text{th}}$ of the feeding trough. Its bottom should have slope towards a drain hole for drainage of dirty water. A sloppy non-slippery stand floor of 1.5 m width having a drainage facility should be provided. A metallic guard rail (preferably of 25 mm GI pipe) should be provided all around to prevent the animal's step in. The top edge of the water should be rounded by cement sand mortar.

Roof

The roof of animal house should be light, strong, durable weather proof and bad conductor of heat. It may be flat or sloppy. Flat roof work well in dry area having low rainfall while sloppy roof is preferred in heavy rainfall area. Materials can be RCC, tiles, slates, wood, bamboo and thatch. All the materials are having their advantages and limitations. Tiles and thatch are not good from hygienic point of view. The pitch angle should be 25 to 30° for thatch and tile roof and 12 to 18° for sheet roof. The slope should be more in high rainfall areas. Height of roof should be 3 to 4 m depending on rainfall and sunshine of a place.

Wall

The structure should be based on pillars and solid plastered wall or wall made of planks should be prepared up to 1.3 m height. It should be washable and easily cleaned. Above this height the sides should be open, which can be covered with jute curtains during chilly and airy winter.

Wind Break and Shady Trees

The tall trees like teak, *semal*, poplar should be planted alongside the east and west boundary wall of the farm. Shady trees like *pipal*, *pakar*, *kanji*, *neem* etc.

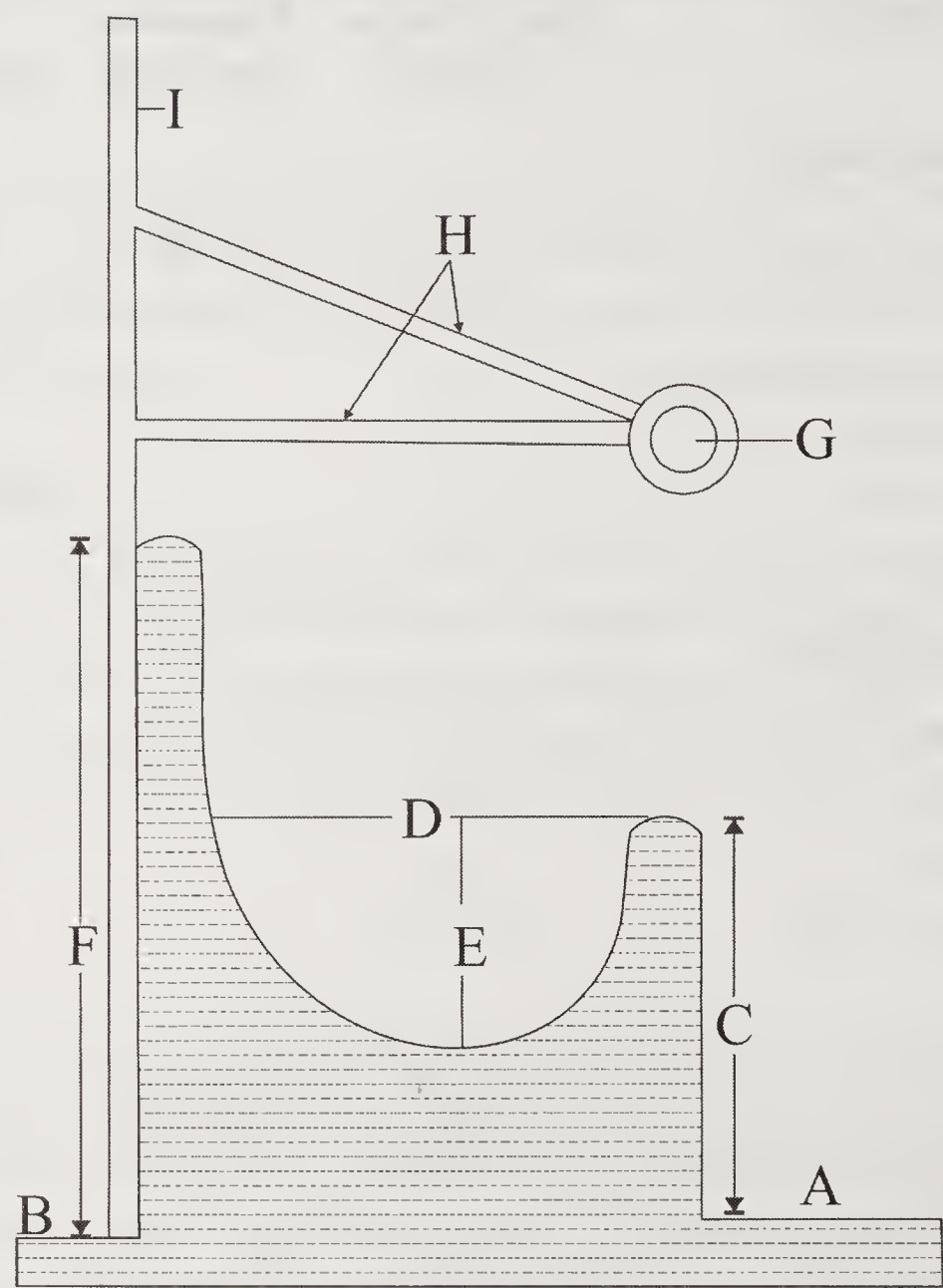
Table 2. Floor space requirement (m²)

Type of animals	Covered area per head	Open area per head	Maximum heads in a shed
Cattle and buffalo			
Bull	12	20	Single
Cows	3.5	7	50
Buffaloes/crossbred cows	4	8	50
Down calvers	12	12	Single
Young calves	2	3	12
Old calves	3	4	30
Sheep and goats			
Ewe/nanny	1		60
Lamb/kid	0.4		60
Ram/buck	3.4		Single
Milch doe + kid	1.4 x1.2		Single
Pigs			
Boar	6 to 7	9 to 12	Single
Farrowing sows along with litter	7 to 9	9 to 12	Single
Weaner/fattner	0.9 to 1.8	0.9 to 1.8	30
Dry sow/gilt	1.8 to 2.7	1.4 to 1.8	10

Table 3. Feeding trough space (cm)

Type of animal	Space per animal	Total feeding trough for 100 heads	Total water troughs for 100 heads	Width	Depth	Height of inner wall
Adult cattle	60-75	6000-75000	600-750	60	40	50
Buffalo/CB cows	75-90	7500-9000	750-900	75	40	60
Calves	40-50	4000-5000	400-500	40	15	20
Adult sheep	40-50	4000-5000	400-500	50	30	35
Adult pigs	60-75	6000-7500	600-750	50	20	25

Fig. 1. Features of feeding trough for large ruminants.



A : Stand floor, B : passage, C : height of inner edge, D : width of trough, E : depth of trough, F : height of outer wall, G : Guard pipe, H : supporting angle iron structure, I : supporting structure for roof

should be planted within the paddock and nearby the sheds for cool shade during hot days.

Some Key Points for Good Housing

- Housing for all species should satisfy the needs of the animals concerned like light, space and area for allowing the animal to exhibit its natural behavior.

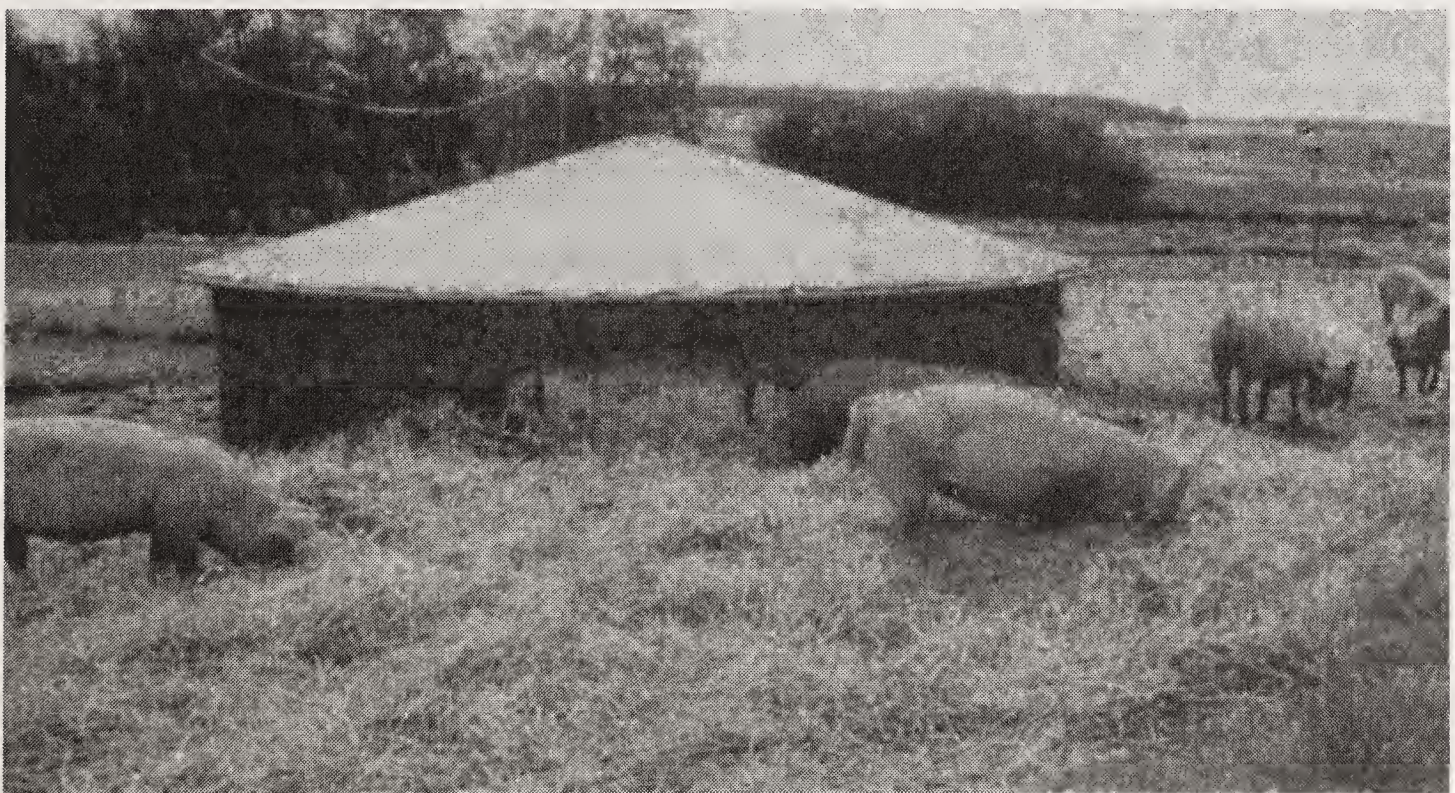
"Herd animals shall not be kept individually"

CONVERSION OF A LIVESTOCK FARM TO AN ORGANIC LIVESTOCK FARM

- Housing must be appropriate to the behavioral needs of livestock. Loose housing with outdoor access and the use of bedding are the cornerstones.
- Farmer should see that there is sufficient free movement with accessibility to fresh air and natural daylight besides protecting the animals from excessive sunlight and rain.



- Animal should have access to fresh water to meet its requirement. Herd animals shall not be kept individually. Tethering, if necessary, should not harm the animal nor it should compromise its behavioural needs. In small farm nature of developing countries in Asia, as also in Africa, tethering is commonly seen. The ropes should be long enough to allow animal to have freedom of movement.
- For Indian cattle, tethering need to be done due to their horn characteristics and aggressive nature. If tethering is to be done, it should allow the animal to move freely with sufficient space.



Housing according to biological and ethological needs of animals

Ethological research suggests that, cattle should be kept in groups of 3-5 animals. When kept inside or confined in pens, animals must have adequate space to lie down, and turn around. Different animal species have their own distinct behaviour, for instance pigs have rooting habits. Pigs find it difficult to perform this activity if kept indoor in confinement under intensive managerial conditions, leading to stress. It is important, therefore, such animals' behavioural needs are taken care of by providing them opportunities to perform their natural habits. Even in conventional systems, for welfare stand point, some animal activists suggest toys for animals. For example, pigs love toys to rub their nose!

Appropriate housing for livestock aims at achieving the following basic requirements-

1. Space large enough for sufficient free movement.
2. Sufficient fresh air and natural daylight through adequate ventilations.
3. Protection against the vagaries of the weather, e.g. excessive sunlight, heat, rain and wind.
4. Enough lying and resting area according to the species and the size of the animals.
5. Natural bedding material for large animals should be provided.
6. Fresh water and feed should be provided for when designing livestock houses by incorporating feed trough and water troughs.
7. The housing should be designed in a way to allow for easy and efficient collection of manures for composting.
8. A gentle slope is essential in livestock houses to facilitate drainage.
9. Livestock housing should be able to keep away predators while not compromising the ventilation aspects especially for poultry.
10. Use of cheap locally available materials is especially emphasized in organic animal husbandry.

Organic animal husbandry emphasizes on a compromise between total confinement of animals as is the case in zero grazing and free range as the best solution especially in the low potential areas where land sizes are bigger and therefore there is more grazing space. Animals for example can spend the day grazing freely and then be on zero grazing at night for security.

Animal Welfare and Organic Farming

“Animal well-being is understood as living in reasonable harmony with the environment, physically as well as psychologically, meaning that the environment

must be of such quality that it is within the adaptability of the animal involved” (Putten 2000).

Animal production is an important feature of organic farming. Organic systems are designed to achieve a balanced relationship between the components of soil, plants and animals, which are as important as others in contributing the overall effect. Animal well-being must be a fundamental attribute of organic livestock production. As sentient beings, animals have highly developed central nervous systems and behavioral needs, which place an added responsibility on the organic livestock producer. The production system is not sustainable if animals show evidence of pain, disease or distress as a result of an inadequate system or disharmony between the animals and the system. The need to prevent such painful situation forms the basis for the concepts of positive health and positive welfare in organic production incorporated in some country’s regulations. This is not only to prevent any pain, discomfort or disease, but to promote health and well being in each animal as well as on herd level and population level. This is a quality of organic animal food products referring to the mode of production, the so called process quality.

In organic production systems, “Animal well-being is understood as living in reasonable harmony with the environment, physically as well as psychologically, meaning that the environment must be of such quality that is within the adaptability of the animal involved”. One of the 17 basic principles of organic agriculture stated in the IFOAM Basic Standards is “to give all livestock conditions of life with due consideration for the basic aspects of their innate behavior” (IFOAM 2005). Therefore, it is often, the perception among consumers that organic livestock have been able to perform more of their natural behavior and have benefited from higher welfare standards than animals on conventional farms. The goals about the improved animal welfare in organic production systems can be combined with the overall goals for organic production. In organic farming systems, certain values and ideas are forming the framework for the production. Key values are naturalness, harmony in all levels of the production, local circulation of the resources and the principle of precaution. Animals in harmony with the surroundings as well as experiencing a good quality of life seem to be obvious part of a system, which favours these values. Generally animal welfare refers to one or several aspects of an animal’s quality of life.

“I believe that the best way to create good living conditions for any animal, whether it’s a captive animal living in a zoo, a farm animal or a pet, is to base animal welfare programs on the core emotion systems in the brain. My theory is that the environment animals live in should activate their positive emotions as much as possible, and not activate their negative emotions any more than necessary. If we get the animal’s emotions rights, we will have fewer problem behaviors... All animals and people have the same core emotion systems in the brain.”

— Temple Grandin (Animals Make Us Human: Creating the Best Life for Animals).

Psychologist Richard Ryder, former Mellon Professor at Tulane University and chairman of the RSPCA in 1977, wrote that it is in 6th century BC in Greek philosophy that we first find concern for the treatment of animals (Ryder 2000). Temple Grandin* has said, “I think using animals for food is an ethical thing to do, but we’ve got to do it right. We’ve got to give those animals a decent life and we’ve got to give them a painless death. We owe the animal respect.”

Welfare Concept

- Scientific concept that describes the status of the animal.
- Value concept that implies moral considerations regarding the animal’s quality of life.

While marketing organic animal products, an important argument is that organic livestock are allowed to

express more of their natural behavior and are provided with better welfare than livestock on conventional farms. As such, if welfare is considered to be a composite concept, the value part makes it context dependant. This in turn implies that relevant values in organic agriculture must be identified and related to a welfare concept.

“To give all livestock, conditions of life with due consideration for the basic aspects of their innate behavior”
....JFOAM basic standards

Basic Values of Animal Welfare Includes Three Concepts

Respect for nature - is based on the perception that all forms of life on the planet are interconnected and interdependent. Humans have a moral responsibility to respect other living creatures and a special responsibility for farm animals since they are directly under human control. Respect of animal integrity and dignity could require the opportunity for the animal to exhibit species - specific behavior in an environment as close as possible to the natural environment of the concerned species. Animals’ needs for social behavior should also be included, for example Cattle should graze in summer, poultry should have access to nests and dust baths and pigs should have chance to rooting. This view implies that naturalness should be important when defining animal welfare.

Sustainability - in organic farming, a major aim is to keep livestock in good health without the use of medication. Ecological sustainability demands minimum emission

*Professor at Colorado State University and a professional designer of humane livestock facilities- a leading expert on the humane treatment of livestock handling.

of foreign substances into the ecosystem for which good animal health and healthy agro-ecological system are necessary. From sustainability point of view, good animal health and good biological functioning are important in an organic animal welfare.

Holistic value - Organic agriculture is based on the belief, that the study of the whole will provide more and better information than the study of the parts only. From an organic point of view, animal welfare should be recognized as a composite concept, based on both the subjective values of concern and scientific measurements. The value aspect should correspond to values advocated by the organic movement.

Animal welfare can be considered as being based on the state of biological needs of the animal. Welfare addresses both the animal and features of its environment. Welfare is about adoptional processes and adaptability. The emphasis in welfare monitoring in general is on deviant animals as well as on risky environmental conditions on the farm.

According to *Farm Welfare Council* animal should be free from

- Thirst, hunger, and inappropriate feed
- Physical and physiological discomfort
- Pain, injury and diseases
- Fear, distress and chronic stress
- Physical limitations to express normal behavior

All the leading animal welfare organizations support organic farming. The Royal Society for Prevention of Cruelty against Animals (RSPCA) stated “we hope that more people/consumers will become aware of the potential for organic farming as one means of alleviating the suffering of farm animals. As a whole, the welfare elements are associated with the biological needs of an animal, which in turn depend on internal and external conditions that are proportionately different between the different needs.

Many challenges do exist in the organic sector to ensure good animal welfare and high health status, and safe animal food products from the farm in the areas like:

- Giving the animals a good life - this is important part of the process quality of the animal food products.
- Ensuring a high health status in the herds - which in turn minimizes the use of all drugs.

- Making the animal production a part of the whole farm - this is to ensure harmony between different production areas of the farm, and to develop the idea of a whole organic farming system, comprising both animals and crop production.
- Processing food of high quality and with no artificial or synthetic substances.

Tool for Animal Welfare

Human-Animal relationship plays a central role in the development of animal-friendly housing systems. It is important to know, how well or badly our farm animals fare, if animal welfare on farms is to be improved. Tool or an index system acts as a guide for the farmer to detect faults in the housing system and as an advisory tool for the advisory agencies in organic farming.

The “TGL 35 L” Animal Needs Index was first introduced in Austria during 1985. It has been under continuous development over the past years. The TGI index system includes the following aspects that are considered essential for animal well-being:

- Movement possibilities
- Possibility of social contacts with other animals
- Floor design
- Climatic conditions in the housing and intensity of care by the farmer.

It is recognized that animals can compensate negative influences in one aspect by positive ones in another as long as their adaptability to their environment is not exceeded. It is also concluded that dehorning is not in line with the ethical values of organic agriculture. Looking at the long horns of the most of the Indian cattle breeds, one would simply miss the natural beauty of these cattle, if they are dehorned. No surprise, dehorning is not a practice indigenous to India.

Animal welfare is an important issue not only under organic livestock production system, but it is also increasingly being emphasized in conventional production systems globally. The OIE, FAO and various bodies like RSPCA and several NGOs have attached high priority to animal welfare and laid down rules to ensure welfare of all animals including domesticated ones. The FAO Gateway to Animal Welfare (<http://www.fao.org/ag/againfo/themes/animal-welfare/en>) is one significant initiative which is a single access point for a wide range of information related to the welfare of farm animals. The Constitution of India Provides Animal Protection by Article 51 ensuring “Compassion to all Living Creatures”. Keeping in tune with the global developments with regards to animal welfare, and constitutional mandate, the Government of India established the Animal Welfare Board of India under the provisions of the prevention of Cruelty to Animals Act, 1960, through a Legislative

Enactment by Parliament. The Animal Welfare Board of India (AWBI) has been overseeing the developments concerning prevention of cruelty against animals and measures to ensure welfare of animals including farm and zoo animals. The Animal Welfare Act 2011 is the latest work of the AWBI which is in progress having detailed provisions on animal welfare. The welfare issues are monitored even more strictly under organic farming systems, since in conventional systems, often the welfare guidelines are overlooked or there is no way to ensure the guidelines are followed.

The Prophet Muhammad (570–632) taught that it was permissible to kill animals, but to do so unnecessarily or with cruelty was forbidden. “If you must kill, kill without torture.”(Masri et al 1987). He saw animals as having internal mental states. They should not be bound when being slaughtered, and should not be made to wait.

To let an animal see you sharpen your knife is to kill it twice (Ryder 2000).

7

Animal Health Management in Organic Systems

Maintenance of animal health and welfare is a major objective of organic animal husbandry. Promotion of health and welfare requires planning with a better understanding of the concept of animal health in organic livestock production systems. Organic standards emphasize on the ‘positive health approach’ which differs from conventional disease treatment and prevention strategies by going beyond the attempts to minimize the risk factors that cause disease (Soil Association 2002). An organic strategy aims at creating farming systems in which the well-being and the basic needs of the animal are the main priorities and can override production objectives, if a conflict arises. The organic principles and standards require that positive health is actively promoted in organic livestock production systems by breeding, feeding and husbandry practices. But this does not mean absence of treatment, since organic livestock too do need therapy when diseased and that positive actions that are directly related to health management are needed in addition to feeding, breeding and good general husbandry.

Concept of Animal Health in Organic Farming

According to the World Health Organization (WHO), “Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”. Yet more often, health connotes ‘absence of disease’. The classical division between body and mind forms the basis of this definition. Holistic approaches to health implied in the ‘positive health’ concept require a broader perspective of animal health and an understanding that a living individual is an entity, where physical, emotional and mental levels are all covered. Health is a characteristic of a living individual and can be understood as an expression of harmony or balance in the individual at all levels. Consequently, health is a more coherent concept than ‘absence of disease’ and disease is defined as ‘disturbance of health’. This holistic approach to the living individual, with its emphasis on harmony within the organism and its surroundings, reflects the objectives of organic farming better than does the definition of health as ‘absence of disease’.

Concentrating on health rather than on disease or production goals moves the focus of health management to the animals and their environment, away from the

diagnosis of disease and identification of risk factors for a particular disease or condition. A holistic concept of health implies that any healthy individual will react to the changes in its surroundings, whereas, disease is considered to be a reaction of a living individual to unsuitable surroundings. In some situations, the disturbance in the interaction between the organism and its surroundings causes severe imbalance that is difficult, perhaps impossible for the individual to cope with, which ultimately results in disease or injury. In organic livestock systems the aim is to implement health planning and promotion that produces interventions at an earlier stage, before such situations arise. Health management in organic farming can be described as an effort to promote the general health of an individual animal or herd by actively improving its living conditions in two ways.

- Selection of animals that are well suited to the conditions on an individual farm.
- By providing livestock access to species specific feed and feeding, housing conditions and freedom to express natural behavior.

In organic concept, the whole animal and the entire system are in focus for health promotion unlike in conventional concept of disease prevention. Good livestock health is seen not simply as the absence of the disease, but also as a high level of vigour and vitality, thus, enhancing the animal's ability to resist parasite infection, parasitic attack and metabolic disorder, and to recover from injury. Moreover, health care in organic farming starts with selection of suitable breeds, raising the livestock according to its natural requirement; feeding good quality feed along with required grazing to strengthen the immune system of the animal and providing suitable housing to avoid related stress and associated health problems. Animal care is the most important focus area when looking for disease factors. It is often impossible to have long-term success in herd health management without a committed farmer. As diseases are linked with disturbances in the system therefore occurrence of any illness in the farm should always lead the farmer to change something. For example, metabolic disorders are often an indication for imbalanced nutrition.

The maintenance of a high animal welfare status is enshrined as one of the principles of organic farming, and good health is obviously a major element in the overall welfare status of the animal. The maintenance of health and welfare status in organic livestock, whilst minimising veterinary treatments, requires a positive approach to livestock husbandry (Boehncke 1997). In any decision the farmer makes - for example, on grazing management, on housing, on reproductive pattern - he should place the highest priority on the likely impact on livestock health. Whilst livestock systems vary enormously and it is difficult to generalize, some of the elements which have been suggested for inclusion in preventive health strategies are listed below (Younie 2000):

- * Self contained herds and flocks
- * Appropriate choice of breed
- * Breeding for disease/parasite resistance
- * Suckling with mother
- * Natural weaning
- * Access to pasture during the growing season
- * Adequate nutrition: high forage, limited cereal
- * Regular monitoring of feed, physiology and health (e.g. silage, milk and urine, faecal worm egg counts)
- * Establishment of a clean grazing system; e.g.
 - Low stocking rates
 - Alternating from year to year (sheep/cattle)
 - Mixed grazing (sheep/cattle)
 - Mixed age groups
 - Use of hay/silage aftermaths
- * If indoor accommodation is required:
 - Adequate space allocation
 - Good ventilation
 - Adequate supply of dry bedding

Even if all the above mentioned elements are well taken care of health problems cannot be eliminated completely whatever precaution one may take. The same range of disease and parasite problems do occur in organic livestock as in conventional livestock. The main health concerns of organic farmers, at least in the UK, tend to be endoparasites and ectoparasites in young stock, and fertility and mastitis in dairy stock (Halliday *et al.* 1991, Roderick *et al.* 1996).

Basic Principles of Herd Health Management

Organic livestock production is a means of food production with a large number of rules directed towards a high status of animal welfare, care for the environment, restricted use of medical drugs and the production of a healthy product without residues (pesticides or medical drugs). Going by this definition of organic livestock production, it is amply clear that animal health management is crucial aspect of this production system.

Disease prevention in organic livestock production is based on the assumption that feeding, housing and care of the animals is such that they have an optimal natural resistance to combat disease. It is based on the principles that an animal that is allowed to exhibit natural behaviour is not subject to stress, is fed optimal (organic) feed, and will have a higher ability to cope with infections than animals reared in a conventional way. Therefore, the extent of effectiveness of husbandry and good management practices in eliminating the need of veterinary intervention will depend on

- The level of disease challenge (production system, stocking density, bio-security, season).
- The resistance of the stock (conditions of management, nutrition, breed, selection within breed, concurrent disease).
- The existence of suitable management approaches (biology/epidemiology of the disease or infection) and the effectiveness of implementation (farm structure, managerial ability, economic pressures).
- Situations will inevitably arise where the disease challenge is too great, or current knowledge too limited, to alleviate the occurrence (chronic or sporadic) of disease by management alone.

According to organic livestock production principles, the emphasis of disease control is

- On health promotion based on a broad, holistic approach.
- One of the aims is to create a herd/flock and a husbandry system that minimizes health and welfare problems by optimizing production levels and by using suitable breeds and animals for the farm in question. Provision of species specific feed and feeding and husbandry that promotes positive health is seen to contribute to this aim.
- Another aim is to reduce the use of conventional, synthetic veterinary medicinal products both as preventive measures and in therapy of diseased animals. The focus is on livestock management that prevents health problems. By taking a holistic approach, recognizing that health is a state of equilibrium and focusing on diet, housing, handling and observation to achieve the balance, the need for veterinary medicines can drop dramatically.
- The objective is to reduce the stress and keep livestock robust and healthy with good nutrition and selective breeding.
- If there are persistent or recurrent illnesses it means that there is a need for a review of the whole farm as well as consultation with veterinarian.

Factors to be Kept in Mind

- Where stock is to be brought from outside the farm, the animals be purchased from a source with equivalent or of high health status.
- Treatment of sick animals should be carried out immediately.
- Non-allopathic medicine should be chosen prior to allopathic medicine, if efficient.
- Routine preventive treatments with allopathic medicines are not allowed.
- Medical treatment requires instruction and diagnosis by a veterinarian.
- Positive animal health in organic production is to be achieved without the use of conventional veterinary medicines at least not on routine basis.
- If an animal receives allopathic medicine more than three times during the year, the animal cannot be considered as organic any more.
- Vaccines shall be used only when diseases are known or expected to be a problem in the region of the farm and where these diseases cannot be controlled by other management techniques. Vaccination should not be on a routine basis, unless legally required.
- The organic farmer needs to keep a log of all veterinary treatment and use of disease control agents.
- There is need to balance the aspirations for consumer confidence, environmental protection and animal welfare.

The application of animal husbandry practices appropriate to the requirement of each species, encouraging strong resistance to diseases and the prevention of infections is required in organic farming. However, no system is perfect and inevitably health problems do occur. The same range of disease and parasite problems occur in organic livestock as in conventional livestock. The main health problems tend to be endo-parasites and ecto-parasites in young stock, and fertility and mastitis in dairy stock. The relative importance of different health and welfare problems will vary enormously depending on the livestock species involved, climate, soil and land quality, and the farming system itself, including the mix of enterprises and the farm infrastructure. They will also be influenced by non-physical factors such as the structure of the agricultural support system and the management skills of the farmer. These factors define the way in which livestock are integrated into the farming system, and directly influence animal health and welfare.

Role/Need of Animal Health Plans as a Preventive Tool

A health plan is a significant first step in improving the health of an organic herd. Prevention of disease is a key part of such a plan, because prevention is especially important in organic management for several reasons, including: the strong emphasis on animal welfare, the aim of minimizing or avoiding the use of chemicals including medicines, longer withdrawal times after use of medicines which imposes greater economic costs. Health plan is an integral part of the approach to positive animal health and welfare. The plan must ensure the development of a pattern of health building and disease control measures appropriate to the particular circumstances of the individual farm and allow for the evolution of a farming system progressively less dependant on allopathic veterinary medicinal products. Animal health plan is “a live document which describes the current animal health status of an individual organic farm and outlines the methods to be used to achieve enhanced status within the whole farm context” (Hovi *et al.* 2004).

Objectives of Animal Health Plans on Organic Farms (OAS 2000)

- To provide a standard animal health plan for all organic livestock producers, so they are compliant with the relevant livestock regulations and standard requirements.
- To ensure compliance with best livestock practices and to promote positive and holistic animal health and welfare.
- To monitor animal health and welfare status of organic livestock and preventive and curative methods used in order to ensure the development of a pattern of health building and disease control measures that allow for evolution of a system that is progressively less dependant on allopathic veterinary medicinal products.
- To provide the farmer and the veterinarian in whose care the animals are, a useful tool to help them in their efforts to improve animal health on the farm.
- To provide the organic inspectors a useful tool in the measurement and evaluation of health and welfare status of organic livestock farms.

Animal health plans should be integrated into the overall management strategy for the farm and, as such are constituent with an organic holistic approach. Although health planning can have various goals within the entire organic production system, they must be set at the farm level by the farmer under the guidance of the local veterinarian, who needs to incorporate them into daily routines on the farm. The health promotion and planning strategies related to conversion will vary from farm to farm, but they should always be based on three key elements (Gray and Hovi 2001):

- The health status of the herd before conversion (e.g. determining existing endemic disease levels and planning accordingly).
- All the planned changes on the farm (e.g. changes in crop production and their effect on herd size).
- The farmers' own goals and objectives regarding the livestock enterprise, remembering that they are likely to change significantly during conversion and the first years of organic production.

Organic livestock systems differ from conventional ones in many ways that can be expected to influence the prevalence of disease, such as feeds, use and non-use of different medicines, housing conditions, and stocking density. Ideally these differences will achieve the goal of fostering animal health and welfare. An important challenge lies in increasing farmers' awareness of the importance of herd health, disease prevention and health promotion and their active participation in working out suitable situation specific health plans.

The following factors should be kept in mind

- Treatment of sick animals should be carried out immediately.
- Non-allopathic medicine should be chosen prior to allopathic medicine, if efficient.
- Routine preventive treatments with allopathic medicines are not allowed.
- Medical treatment requires instruction and diagnosis by a veterinarian.
- The organic farmer needs to keep a log of all veterinary treatment and use of disease control agents.

If an adult animal receives allopathic medicine (such as antibiotics) more than three times during the year, the animal can not be considered as organic any more. For an animal with a lifetime of less than a year, such as fattening buffaloes or pigs, only one treatment with allopathic medicine is allowed. The withdrawal time for allopathic medicine is set to twice the length required by veterinary authorities. Artificial reproduction methods different from artificial insemination (such as embryo transfer technology) are forbidden. Generally, a farmer must have used certified organic practices for two years before the product is sold as organically grown. Positive animal health in organic production is to be achieved without the use of conventional veterinary medicines, at least not on a routine basis. This provides a safeguard for the health of human consumers of organic livestock products. Such products are less likely to contain drug residues such as antibiotics and hormones, as a result. Reduced levels of antibiotic resistance in indicator bacteria have been reported in organic broiler flocks compared to conventional ones. A potential conflict

may arise when discussing how to deal with the presence of zoonotic organisms, such as *Salmonella*, *Campylobacter*, and *Escherichia coli*.

There have recently been accusations that organic products are more likely to be contaminated by such bacteria than conventional ones because of the reliance on animal wastes as fertilizers. There is little documented evidence to support this contention, although researchers found a higher prevalence of *Campylobacter* in organic broiler flocks than in conventional and extensive indoor flocks in Denmark. A high degree of outdoor life, in combination with a goal of minimizing the use of antimicrobial treatments in general, may present a challenge or even a risk with respect to zoonotic diseases. More research is needed on these aspects especially in context of organic livestock production. It should be realized that organic production is not a solution to every problem but it also has research needs in order to make it more sustainable by meeting the challenges posed due to introducing it as an emerging system of production often replacing the conventional ones.

Factors Helpful to Build Immunity

- Healthy soil- there are reports that, animals fed organic rations were healthier than when fed on crops from heavily fertilized crops
- Colostrums feeding to young ones
- Use of probiotics-*Lactobacillus* fed to calves increases the numbers of beneficial bacteria in the gut. This prevents harmful bacteria such as *E. coli* from occupying a binding site on the intestinal wall so it passes harmlessly through the animal.

Vaccination

In organic production systems, vaccines are used only when diseases are known or expected to be a problem in the region of the farm and where these diseases cannot be controlled by other management techniques. In addition, univalent rather than multivalent vaccines should be used. Vaccines are designed to improve the immune status of animals and since immune function is one of the main methods of achieving positive health in organic livestock, it can be argued that vaccination should be encouraged. The accredited certification programme is expected to define conditions for such cases. However, legally required vaccinations are allowed but genetically engineered vaccines are prohibited in organic farms.

Homeopathy as a Part of Health Management on Organic Farms

The indiscriminate use of allopathic products in a blanket preventive fashion offends the values of organic farming. The decision to use alternative medicine

must be on the basis of a therapeutic effect, appropriate to the condition and the target species. Assumed clinically effective, homeopathic treatment would have several positive implications. Homeopathy has a developing role in replacing the need for more conventional therapies. It is regarded as a therapy with minimal side effects to the animal and no negative environmental effects or danger of developing drug resistance in bacteria or parasites. The holistic idea of homeopathy appears to be in accordance with the ideas of organic farming, thus, homeopathy or phytotherapy are recommended according to prevailing regulations, yet not many organic farmers use this treatment regimen because of lack of scientific evidence of effectiveness (Kijlstra and Eijck 2006).

In Homeopathic therapy, the herd is seen as a system with individual animals and similar symptoms. For acute diseases, homeopathic remedies are used on an organotroph or functiontroph level initially for example at udder level or targeting metabolism. If necessary, more than one single remedy is used, that allows the use of synergistic effects on different levels. If the symptoms are seen repeatedly over a period of time, homeopathic principle to chronic diseases are applied. Homeopathy is a regulation therapy, which can always be used if it is possible to heal the body systems by stimulation (immune system, regulation of metabolism). It is not the method of choice, if the body system is exhausted, if a substitution therapy is necessary or if an organ irreversibly damaged. Although it is not possible to substitute surgery in most cases, however, homeopathy can accelerate the healing after surgery. Extended use of homeopathic therapy, in a situation where it has no or limited effect, will, however, have negative effects on animal welfare, production and economy, and may allow the spread of contagious diseases.

Some of the Possible Remedies in Homeopathic Group

(Martini *et al.* 2001)

Syndrome	Remedy
Abscess	Hepar sulphur, Silicea
Conjunctivitis	Hepar Sulphur
Diarrhoea	Natrum muriaticum
High SCC	Silicea, Bryonia
Infertility and uterine infections	Phosphorous, Sepia, Lachesis, Apis mellifica, Pulsatilla, Calcarea carbonica, Calcarea phosphorica, Podophyllum, Sulphur
Lameness and limping	Carduus marianus, Silicea, Arnica montana, Calcarea carbonica, Causticum,

	Lycopodium, Mercuris solubilis, Natrum muriaticum, Pulsatilla, Pyrogenium, Zincum phosphoricum
Low starting lactation	Calcarea carbonica, Natrum muriaticum
Mastitis	Bryonia, Silicea, Phytolacca, Nux vomica, Belladonna, Calcarea carbonica, Conium maculatum, Pulsatilla, Pyrogenium, Sepia, Aconitum napellus, Apis mellifica, Arsenicum album, Calcarea phosphorica, Carduus marianus, Kali bicromicum, Kali muriaticum, Lachesis
Milk retention	Caulophyllum
Mycosis	Bacillinum, Sulphur, Natrum muriaticum
Neonatal diarrhea	Arsenica album, Camphora, Natrum muriaticum, Podophyllum,
Placenta retention and Post-partum diseases	Sepia, Arsenica album, Pulsatilla, Sabina, Bryonia, Calcarea carbinica, Lycopodium and Pyrogenium
Respiratory infections	Kali carbonicum, Natrum muriaticum, Phosphorous
Rickets and weakness of cow after calving	Calcarea carbonica, Calcarea fluorica
Strongylosys	Cina
Tapeworm	Filix mas
Telitis	Causticum
Toxicosis	Lycopodium, Carduus marianus, Nux vomica phosphorous,
Udder nodosities	Conium maculatum, Hepar sulphur, Silicea
Udder ulcer	Mercurius solubilis
Uterine fibroma	Calcarea carbonica, Silicea
Warts	Sulphur, Thuja

Limitations of Homeopathy as an Exclusive Therapy in Cattle

There are certain limitations to exclusive homeopathic therapy. In most of the conditions listed in the above table, homeopathy could only be used as a support therapy in addition to conventional treatment. To ensure good animal welfare, it is obvious that, for example, a post partum hypocalcaemia is treated with a calcium infusion to address the acute condition of the animal. Similarly, a calf with severe diarrhoea and dehydration needs allopathic rehydration therapy. In such cases, homeopathy doesn't work fast enough. Other examples are cases where surgical treatment is needed, e.g. for fractures or displaced abomasums.

Homeopathy is contraindicated in

- Life threatening situations
- Hypocalcaemia/ Hypomagnesaemia
- Dehydration
- Shock
- Ileus, intestine or gastric dislocation
- Fractures/Wounds
- Incurable organic damages
- Epidemic diseases

Homeopathy has restricted applicability in case of

- Parasites
- Chronic diseases
- Behavioral disorders
- Breeding diseases
- Tumours

Treatment of epidemic diseases (for instance FMD) with homeopathy is restricted by statutory disease control measures. Homeopathy is only partially helpful in parasitic diseases. Pasture management appears to be a more appropriate method to address intestinal parasite problems in a herd. For economic reasons, individual animals with chronic disease, e.g. chronic mastitis or long-term sterility, should not be treated in most cases. When chronic conditions are herd problems, the use of homeopathy may be financially sound, particularly in cases where allopathic treatments are not very successful. Treatment of disease can only be successful if

the ability for the body's self regulation is not overloaded. Short term high production levels cannot be and should not be the aim for organic farming. Instead, animal health should be primary aim, and production targets should be set for lifetime. Under organic production conditions, homeopathy can be a good complementary therapeutic tool in farm animal medicine to maintain health of both animal and man.

Prevention of Health Problems and Alternative Treatments

Mastitis

- Quality of milking method
- Homeopathic remedies-
Aconite 6x- one dose every half an hour- 6 doses
Belladonna IM-when udder hot, red and sensitive to touch – one dose every hour – 4 doses
Bryonia alba 30 for swollen hard udders
Acute: 1 dose every 4 hours, 4 doses
Chronic: 1 dose, 2 times /week for 1 month.
- Stripping every two hours in an acute case
- Vitamin C: 50-100 cc of liquid injected under skin or into milk vein in an acute case.
(specific case of mastitis in relation to homeopathy treatment has been dealt with separately elsewhere)

Milk fever

- Keep fields well limed
 - Balance of nutrition
 - Blood profiles
 - Vitamin C
 - Homeopathy
- For prevention
- Calc Phos 30- 1 dose/week for 3-4 weeks before calving.
 - Mag Phos 30 – 1 dose/week for 2 weeks before calving.
 - Herbal liver tincture
 - Protein feed (a Colostrum product as a boost)

Lameness

- Good road, sloped stalls
- Nutrition- over feeding of concentrates cause problems

ORGANIC LIVESTOCK FARMING

	<ul style="list-style-type: none">● Check for high potassium levels in feed● Timely hoof trimming● Homeopathic remedies● Foot bath –Silica 200 for hardening of hooves● Copper sulphate
Fertility	<ul style="list-style-type: none">● Nutrition-Kelp meal● Homeopathy-Pulsatilla 30 – 1 dose twice daily for 1 week follow with sepia 200- two doses in one day
Feed deficiencies	<ul style="list-style-type: none">● Soil fertility● Ration balancing and mineral supplement
Ketosis	<ul style="list-style-type: none">● Homeopathy - Lycopodium 1 day for ten days Nux vomica 1 for 5 days● Liver tincture
Internal parasites	<ul style="list-style-type: none">● Rotate pasture● Herbal preparations
External parasites	<ul style="list-style-type: none">● Essential oil of lavender- 20 drops in 1 gallon of water applied to the back of animal with a pump sprayer● Neem oil
Calf diphtheria	<ul style="list-style-type: none">● Feed antibiotics- lactobacillus acidophyllus● Take of milk for 48 hours, feed lots of lukewarm water with electrolytes● Clay powder, light kaolin
Calf pneumonia	<ul style="list-style-type: none">● Better ventilation● Homeopathy● Colostrum whey

**For all conditions, when a cow is stressed
Vitamin therapy is very helpful.**

The organic livestock farming *per se* has not yet well established in many developing countries. The experiences of farmers in developed countries especially in Europe could be a good guide on many aspects including animal health

management for the developing country farmers. Analysis of the medicines used by organic livestock farmers shows that not many farmers use alternative or complementary treatments in view of lacking scientific evidence (Kijlstra & Van Der Werf 2005).

Control of Internal Parasites

Organic systems seek to reduce reliance on external inputs and develop sustainable methods of production, which balance output with high standards of animal welfare. Internal parasites, specifically nematodes, are significant potential threat to the health and productivity of ruminant organic livestock. Organic farms tend to have lower stocking rates, and a better balance of enterprises. Under optimum conditions of stocking rate and rotational grazing, it is possible to eliminate anthelmintic from hill and upland organic systems. However, these optimum conditions rarely apply in most commercial situations. Effective alternatives to the use of pharmaceutical anthelmintics are a serious technical and ethical constraint for the organic livestock sector. There is a clear need to develop additional strategies, within the ethos of organic farming, which can support and increase the flexibility of basic clean grazing systems. Energy, protein and mineral nutrition can affect the host response to parasitic infection. In particular, protein supplementation has been shown not only to improve resilience, but also to enhance the expression of immunity to gastrointestinal nematodes. Improved understanding of host/parasite/nutrition interrelationships could provide a basis for the manipulation of diet in the control of internal parasites.

Options for Control of Gastro-intestinal Nematodes

The options for control of gastrointestinal nematode infections that do not rely on the routine use of anthelmintics be grouped as follows:

a) Management Procedures

- Monitoring and intervention with anthelmintics - monitoring of faecal egg counts and intervention by anthelmintic treatments, if the mean count of a particular group of animals is above certain limit (e.g. 400 epg in lambs). Monitoring of clinical conditions.
- Grazing management - by means of providing clean pasture (introducing livestock on a new pasture where herbage contamination is nil or minimal), safe pasture (pasture with a slightly higher risk compared to clean pasture) and diluting procedures (mixing with other species). This holds good for stall feeding too since cut fodder may have the same problems.
- Level of nutrition - protein supplementation of ewes around lambing may limit the peri-parturient rise in faecal egg counts which depends on the protein level during pregnancy.

- Bioactive forages- e.g. condensed tannins. Bioactive forages can be characterized as forages containing secondary metabolites, substances that may lead to a specific effect on livestock (e.g. elimination or prevention of an infectious disease or deficiency, correction of a mineral deficiency or improvement of product quality). In contrast to many temperate medicinal plants with a putative anthelmintic activity, the bioactive forages are generally non-toxic and correct dosing is not a crucial issue. It should be possible to feed the bioactive plants as a major part of the diet, either cut or grazed and should preferably, be cultivable in the crop rotation. Studies in the Northern hemisphere have shown that certain leguminous forages with a relatively high level of condensed tannins fed to sheep may lead to lower the faecal nematode egg counts and worm burdens.

b) Genetic Resistance

Some breeds or lines are resistant or more tolerant to internal parasites. Native and local breeds of India are more resistant to parasites than exotic breeds. Using bulls of good parasitic resistance to develop the herd will increasingly make it resistant over time.

c) Biological Control

The use of nematophagous microfungi, in particular, the species *Duddingtonia flagrans* (a normal inhabitant of sheep and cattle dung and compost) as concentrate supplementation under group feeding conditions or in molasses blocks. In organic farming, the use of biological agents may be questioned because it can be considered as an external input to the system and also from the aspects of environmental impact, like unwanted effects on soil nematodes and competition with other potentially beneficial fungi. Studies performed so far, indicate no persistence of the fungus in the environment and no detectable influence on the soil nematode fauna. The use of fungus as biological control seems to be within reach in the near future but several problems related to the administration of fungus have to be solved. Furthermore, the timing, length of dosing and relevant group treated has to be determined under different epidemiological and management conditions.

d) Vaccination

Vaccination for organic livestock can be carried out with only legally required vaccination.

Integrated Parasite Management for Livestock

Internal parasites are considered by some to be one of the most economically important constraints in raising livestock. Confinement and pasture-based animals are almost certain to be exposed to worms at some point in their life. Animals raised on the dry and arid rangelands as in Western Rajasthan, parts of Gujarat,

Telangana in Andhra Pradesh are much less likely to be infested. There is no simple alternative way of preventing or treating worms.

By looking at the whole farm as an interrelated system, it becomes apparent that there are parts of the system that can be managed to decrease internal parasites and their effects. These management adjustments not only postpone the day when chemical controls no longer work, but they also may decrease costs and improve the overall health of the animal.

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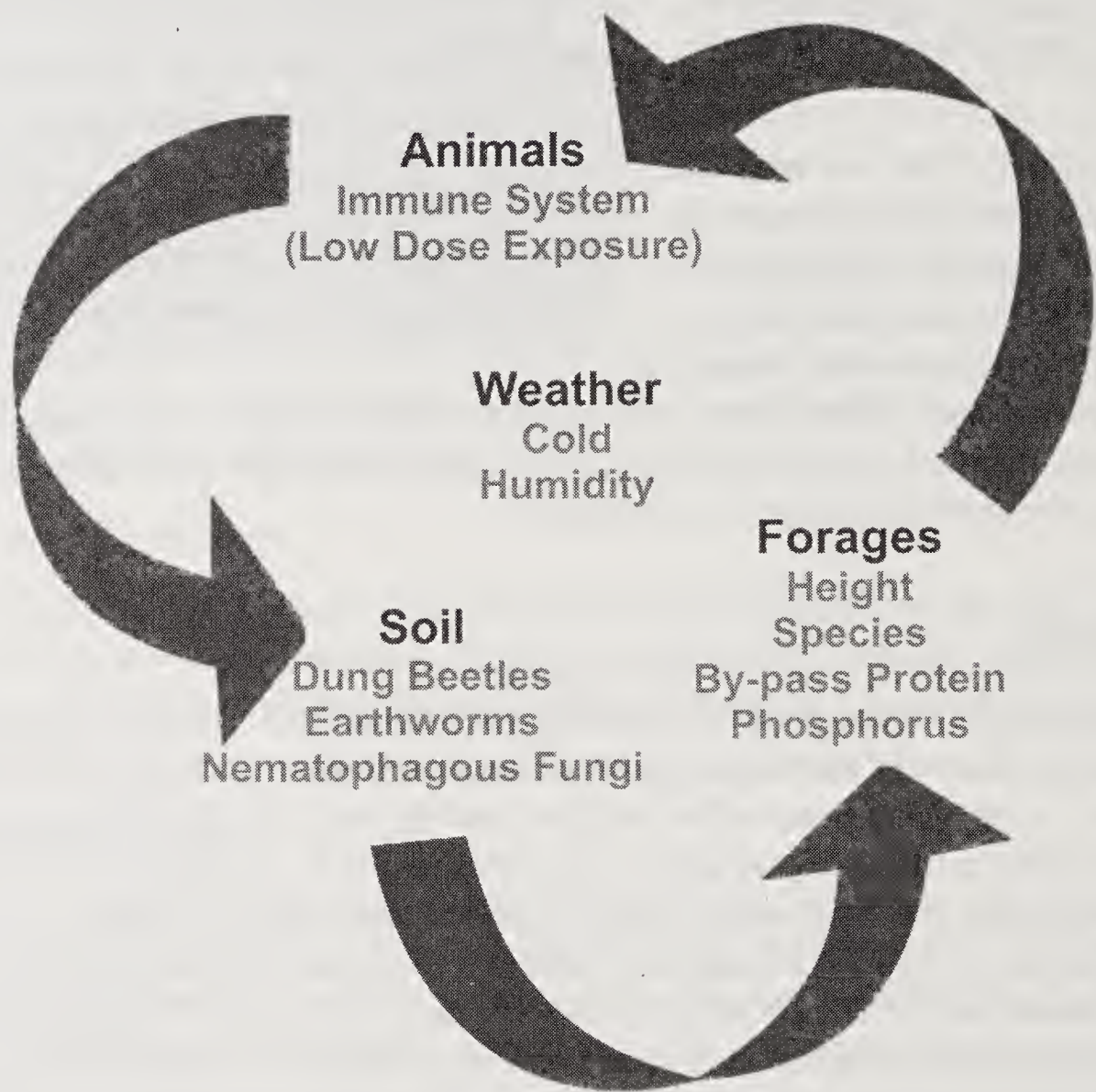
Nutrition

Nutrition plays a major role in how well animals are able to overcome the detrimental effects of internal parasites. In fact, the signs of parasitism can often be used as a symptom of some other problem, usually poor nutrition. There are links between diet, particularly vitamins and minerals, and susceptibility to internal parasites, particularly in deficiencies of cobalt and copper. Weaning age is an important factor in parasitic resistance. Milk-fed calves are distinctively less infected than weaned calves. Ideally females should calve, when risk of contamination is low, so that young animals are exposed as late as possible to contaminated grazing areas. Regular feeding of plants known to have de-worming properties can be a preventive measure. This practice was often part of traditional husbandry practice in India. It is reported that animals placed on a high plane of nutrition are generally able to reduce their worm burden significantly and many of them may be able to cure themselves as well.

Grazing Management

Feeding of animals on pasture was the main practice in ancient India, since common property resources were commonly available for animal grazing. According to Kautilya's *Arthashastra*, it was the duty of the king to identify and provide enough land for pasture near each village (Somvanshi and Yadav 2003). For its multiple benefits, grazing of animals is emphasized in organic livestock farming, but grazing area is declining rapidly forcing farmers to keep animals in confinement limiting their opportunity to exercise and graze wide spectrum of vegetation. The benefits notwithstanding, grazing create parasite problems also. Therefore, wherever, pastureland or forests are available and animals are having access to grazing,

Integrated Parasite management for Livestock



management of animals and pasture areas is key to reducing the amount of internal parasite problems in livestock. An understanding of the life cycles of the different parasites within the whole soil-plant-animal system will help show the interrelationships between these three components. Managing internal parasites is just like managing fleas in dogs and cats. The major part of the parasite life cycle is outside of the animal. This point will help the producer to choose management strategies that reduce parasite levels on his or her farm and decrease the usage of chemical de-wormers.

Good grazing management includes the use of clean pasture to minimize re-infection. Clean pasture is pasture that has not been grazed by the host animal for example, sheep and goat for 12 months, and therefore is not contaminated with worm larvae. It may be new pasture, pasture grazed by livestock such as cattle, which do not share parasites with sheep (goats do share parasites with sheep). Cleanliness is a defense against parasites. Feed troughs and water sources located where they can be contaminated with faeces increases the chances of livestock infestation. This is only one reason not to water directly from ponds, or to allow

animal continuous access to water sources. Feeders should be cleaned and elevated. Calving and lambing areas, as well as other holding areas, should be clean and dry. Prevent the transmission of infestations from new arrivals to the herd or flock by de-worming them before arrival and again three weeks later.

Immunity

While it is usually neither possible nor advisable to completely eliminate internal parasites in livestock, reduction of parasite load can be achieved. Many people have found, and research has shown, that adult animals rarely need to be dewormed. Most animals develop immunity against internal parasites, though not to the level that is developed against viruses and bacteria. This immunity prevents the parasites from reproducing but rarely kills them. It is the young animal whose immune system is not fully mature and the animal whose immune system is compromised by disease, inadequate nutrition, or other stress is most adversely affected by worms.

Every farm differs with respect to farm size and herd dynamics as also the socioeconomic, educational and awareness level of farmers is different. The way small farmers raise livestock and commercial farmers maintain dairy animals, there is huge difference. The parasite load of the animal depends on many variables - such as stocking density, time of year, the reproductive state of the animal, etc. Good nutrition plays a big part in how well the animal's immune system mounts the proper defense, and in the animal's overall ability to tolerate the presence of some worms. Healthy and well-nourished animals will be able to develop resistance and resilience to worms and other parasites much better than thin animals that do not have good availability of quality feed. Resistance is the ability of an animal to prevent the establishment and maintenance of a parasite population within the gastrointestinal tract. Some individuals and some breeds show more resistance to parasitic infection than others. The native breeds are often found to be less susceptible to parasitic infestation and infections.

Soil Organisms

There are several soil organisms that can have an impact on parasites. Managing grazing areas or pastures to favour populations of beneficial soil organisms will decrease parasite levels on pastures. Earthworms have been shown to ingest worm eggs and larvae, either killing them or carrying them far enough below ground to keep them from maturing. Dung beetles ingest and disperse manure, taking it to their burrows, thus keeping eggs and larvae from developing. There are also nematophagous fungi that produce "traps" that engulf and kill parasitic larvae. These fungi are more delicate than other fungi, so there are rarely great numbers of them in the soil. If the soil is depleted or out of balance, other dominant

microorganisms will replace these fungi. Research in New Zealand and the Netherlands is in progress using nematophagous fungi to determine if they can be fed to cattle or other ruminants to kill larvae in manure piles and the surrounding soil. The amount of time that faeces remain on the pasture has an effect on the number of parasite larvae that survive and mature. Anything that hastens the breakdown of the faeces will lessen the number of larvae. This can include the soil organisms mentioned above, mechanical dragging of pastures, poultry or other animal disturbance and the consistency of the faeces themselves.

De-worming alternatives exist in herbal medicine. Herbs such as garlic make the intestinal tract healthier. Since, worms and other intestinal parasites have evolved to thrive in the unhealthy digestive tract; anything that will make that environment healthier will be detrimental to their survival.

Dealing with Parasite Problems

Despite the best efforts to reduce the parasitic load, if the poor animal performance indicates higher levels of parasitic infestation, then de-worming has to be considered.

- First make sure, it is parasites that are causing problem.
- A veterinary faecal analysis will identify the species and count the eggs of the parasites per gram of stool.

De-worming is recommended for

- Susceptible animals about three weeks after being put on to grazing
- Grazing companions of heavily infested animals.
- All animals in heavily grazed pastures, after rainy season.

How to De-worm?

All de-worming treatments involving natural products should ideally be preceded and followed by a fasting period, except, in the case of nursing animals. Animals should not be fed for a period of 12-48 hours before the treatment and another 6-hour period afterwards. In case of milking dairy cows, it may be preferred to lighten their diet rather than to fast them.

Botanical De-wormers

Garlic- A common plant de-wormer that is active against several types of worms including large round worms and lungworm. It acts by preventing the eggs from developing into larvae. It is used generally for prevention rather than treatment.

Crucifers (mustard family) - White or black mustard seeds in the amount of 50 g work as safe de-wormer. Give the herd access to mustard in pasture or elsewhere. In India, some cattle farmers use mustard oil against parasites in the amount of 100 to 150 g per day for 1 week. Mustard oil is more of a laxative than a de-wormer but nevertheless useful in eliminating some parasites.

Cucurbits-The seeds of squash, pumpkins and many other vine crops contain a de-worming compound called cucurbitacin that is effective on the parasite. The seed can be fed directly to the animals but it is better to extract the main ingredient using water, alcohol or ether, for an effect that is similar to that of pumpkin seeds.

Copper sulphate-A mineral substance regulated for use in organic plant production, has a strong deworming action against the stomach worms like *Haemonchus contortus* and *Trichostrongylus axei*. Copper sulphate is administered in a 1% solution in water, in the amount of 50 ml per lamb or 100 ml per adult sheep and 30 ml/22.5 kg of live weight for calves to a maximum of 100 ml.

Manure Management

Good manure management, in any livestock enterprise is important, especially necessary on organic farms. Manure is a valuable resource, when it is stored and handled in a way that retains nutrients so they can be returned to the soil and made available to subsequent crops. Losses result not only in a waste of resource, but also create serious pollution problems. Cattle urine and dung are having multiple uses, farmers can improve their returns from animal enterprise by taking advantage of innovative products sale out of cow urine and cow dung.

Composting

Composting is a good way to clean manure. The larvae and eggs of nematodes are destroyed at temperatures as low as 32° C to 34° C (90°-93°F), in as little as one hour at 50°C (122°F), and in less than 4 hours at 44°C (111°F). When turning the compost, ensure that the outer layer, which has heated less, is mixed towards the middle of the pile. It is especially important to compost manure, when dangerous parasites like lungworm are present. Sodium and potassium sulphate applied at a rate of 1:23 to sheep manure also kills parasites. Only application to the surface of manure pile is needed, since temperatures in the middle of the pile should be high enough to eliminate the parasites.

Learning to make good quality compost is an essential part of making the transition to organic farming and it is important to recognize that pile of partially rotten manure that has been left for several months is not compost, as we commonly see in rural areas . The composting process imitates the decomposition of organic

matter that occurs in soil and turns raw manure into humus. Composting also reduces odours and ensures that heating destroys any harmful strains of *E. coli* that might be present in livestock manure. In a warm, moist and aerobic environment the organic matter is decomposed by the successive action of bacteria, fungi and actinomycetes. For good results, the material to be composted must have a carbon, nitrogen ratio of 25-35:1. This is achieved by mixing ample amounts of bedding the carbon source, with the raw manure. Compost piles can heat up to 60-70° C (140-158°F) due to the microbial activity, but the more desirable temperatures are between 50-60°C (122-140°F). Higher temperatures will result in substantial losses of nitrogen in the form of ammonia gas. Overheating may indicate deficient moisture levels, too much nitrogen or too much carbon. In wet climates, it is important to use covered areas for composting. Windrows should not be located near waterways or tile drains. Ideally there should be a way to retain any liquids that may leach out into the soil.

Fly Control Programme

In tropical environment, flies, mosquitoes and other insects are a common phenomenon. Therefore, it is important to control these insects especially flies which quite often hover around milk and milk pans. Since organic livestock farming relies more on preventive measures, it is important to minimize disease causing or spreading possibilities due to flies. An effective fly control programme will incorporate many of the following practices, but the most important is good sanitation.

- Remove breeding sites by practicing good sanitation- frequent clean-up at least once a week and disposal or storage of animal manure, bedding, and spilled feed is needed to break up the fly lifecycle. Manure stacks should be steep-sided, compact and dry. Wet areas should be eliminated. Turn compost to move fly eggs to center of the pile where they are killed by high heat. Once a week inspect cattleyards, animal pens and garbage storage areas for breeding areas.
- Setup fly free rooms- keep the milking areas and tank storage room free of flies with tightly screened doors and windows and indoor traps.
- Drag pasture—drag pastures with a harrow in hot and dry weather to break up manure so that eggs dry out and die.
- Trap adult flies- traps can significantly reduce flies when sufficient number of traps are placed in correct locations and kept functional. A variety of different traps are usually available in market.
- Use of biological controls—biological control has a role to play in organic farming. Natural enemies include predators such as beetles and mites which devour eggs and larvae and parasite wasps which kill immature stages.

Organic livestock production is considered as safe and healthy for the well being of not only the animals and human beings but also it safeguards the environmental quality. To ensure that it offers what is expected from it, an organic farmer has to take utmost care to the minute level and he can not ignore any aspect which makes him a responsible organic farmer. The parasite control is one area, where, negligence is often seen but it may have implication in certification and product quality.

Organic Ways of Tackling Diseases in Animals: The Case of Mastitis in Dairy Cattle

The conventional therapies involving veterinary drugs including vaccinations are generally discouraged under organic livestock management, for their adverse effect on environment, animals and human beings who consume animal products. According to the organic livestock production principles, the emphasis of disease control is on health promotion based on a broad, holistic approach. One of the aims is to create a herd/flock and a husbandry system that minimize health and welfare problems by optimizing production levels and using suitable breeds and animals for the farm in question. Provision of feed and feeding and husbandry that promotes positive health is seen to contribute this aim as well. Another aim is to reduce the use of conventional, synthetic veterinary medicinal products both as preventive measure and in therapy of diseased animals. Thus, alternative treatment methods and practices, viz. homeopathy, *ayurvedic*, *unani*, *Chinese* systems of medicine including validated traditional practices find place in treatment of various ailments and disease in animals under organic management.

In the light of the restrictions set on conventional medicine use and the recommendations made on complimentary medicine, organic livestock farmers as well as the scientists and development workers are expected to explore the potential use of complementary and alternative therapies. The alternative medicines, however, should be very cautiously used with proper testing for their therapeutic effect for the species of animals, and for the condition for which the treatment is intended.

As per the guidelines of organic livestock production, health care practices follow the principle of positive health; the graduated approach of prevention, including appropriate vaccinations, then natural medicines and treatment, and finally if unavoidable, treatment with allopathic drugs. Medical treatment considered necessary for the welfare of an animal is never withheld in order to maintain the organic status of the animal, since animals are not allowed to suffer for lack of treatment. The use of antibiotic and other allopathic medication is strictly limited to the treatment of illness and injuries under the supervision of qualified personnel, and subject to defined withdrawal periods that are not less than double that required by legislation. It has been attempted here to explain in detail, what does these guidelines mean in practice, taking the case of bovine mastitis, as an example.

Mastitis: An Overview

The most frequent disease in dairy milk production is mastitis. Mastitis, inflammation of the mammary gland is a multifactorial disease which attributes to one of the most difficult mammary pathologies to control. In dairy animals, it is a problematic disease since ancient times and it is not likely to be eradicated so easily due to multiple causes, organisms involved and their complex pathogenesis. It adversely affects milk quantity and quality, adds treatment burden on dairy farmers, antibiotics used in its treatment lead to harmful residues in milk and interfere with the immune system of the dairy animals. Moreover, antibiotics are either not allowed or restricted to treat mastitis in organic systems. Mastitis, thus, leads to serious economic losses to dairy farmers all over the world. Mastitis is found everywhere, be it Europe, New Zealand, US, where, sanitation and hygiene is attached top priority and animals are mostly high yielder; or in the less developed countries, where, animals are largely low producing and poor hygiene is a problem. Many believe, it is a managerial problem, hence, can be prevented by ensuring hygiene in the dairy sheds. But, mastitis is also common in dairies with best possible hygienic conditions. Mastitis is also a big problem in organic dairy farms of Europe and other developed countries. The National Mastitis Council of USA estimates an overall loss to animal agriculture of \$2 billion (approximately \$180.00 per cow) due to mastitis (NMC 2004). These costs include reduced production, discarded milk, drug therapy, veterinarian costs, premature culling and increased labour. Mastitis causes annual losses of over Rs 6000 crores to India's Dairy Sector. Of this, Rs. 1700 crores are lost due to clinical mastitis and Rs. 4400 crores due to sub-clinical mastitis (Financial Daily 2002).

Mastitis in Organic Dairy Farms

Mastitis is a common problem in commercial, conventional dairy farms as well as in subsistence small scale dairy production systems. The reports are now available that in organic dairy farms in dairy developed nations of North, mastitis is a serious problem as well. Mastitis in organic dairy production has been very well highlighted as a problem (Busato *et al.* 2000, Offerhaus *et al.* 1993). It is a considerable problem in organic milk production, and research is needed to evaluate not only on preventive measures but also therapeutic alternatives (Walkenhorst 2001). The incidence of mastitis has been found to be higher in organic than in conventional dairy production in UK (Hovi and Roderck 2000) and in Germany (Sundrum 2001). Whereas, the incidences of mastitis were less in organic dairy farms in comparison to conventional ones in other European countries, viz. Norway (Ebbesvik and Loes 1994), Denmark (Vaarst and Enevoldsen 1994) and Sweden (Hamilton *et al.* 2002). Weller and Cooper (1996) observed that the clinical mastitis is the main health problem for the organic dairy farmers in UK, where many cases were successfully treated with alternative remedies; however, on the majority of farms, antibiotics were used to

treat the more severe cases. Whereas, the routine use of antibiotics has led to consumer concerns in regard to food safety and an increased interest in organic dairy farming and the withdrawal of antibiotic use as a routine treatment especially in the organic dairy farms of UK (Weller and Davies 1998).

Studies of differences in somatic cell counts have revealed that although the organic dairy cattle herds in general are treated less for mastitis, the somatic cell count was similar (Herdeng and Edge 2001) or less (Vaarst and Enevoldsen 1994) between the two systems. In Dutch organic farms, milk production was lower and Somatic Cell Counts (SCC) were higher on long standing organic farms than on conventional and converted organic farms (Nauta, Brass and Bovenhuis 2006). However, such comparisons are rather difficult to do due to structural differences between the two production systems (E.von Borell and Sorensen 2004). Nevertheless, the available evidence indicate that mastitis is as much a problem in organic dairy farms, where, there have been concerns as to whether restrictions on use of antibiotic treatment could lead to under treatment of sick animals in organic livestock production. This scenario makes it imperative to search the alternative to the conventional treatments involving antibiotics. Some of the alternatives which need attention especially in context of mastitis prevention and control in dairy farming under organic management have been discussed as a case.

The Available Therapies

The most common bacterial infection in dairy cows is mastitis. Presently antibiotics are used for its treatment. However, antibiotic therapy of established mammary infection during lactation is only moderately efficacious. The conventional antibiotic therapy generally fails due to lactation drainage, inflammation of the mammary parenchyma, poor activity of mammary cellular defense and infections around the dairy farms (Sandholm *et al.* 1998). Furthermore, indiscriminate use of antibiotics leads to development of multiple drug resistant mastitogen, besides these antibiotic residues, drug resistant bacteria and their products present in the milk causes threat to consumers' health. These facts highlight the need for completely newer moieties for treatment of mastitis. In the recent years, researchers throughout the world are investigating the role of alternative methods for prevention and control of bovine mastitis. These ameliorative measures are bacterial enzymes, antibacterial peptides, bioresponse modifiers, corticosteroids, cytokine therapy, micronutrients, vitamins and traditional medicine (Sordillo *et al.* 1977, Mukherjee *et al.* 2004). Vaccination against the disease using the recombinant DNA technology has an important role in future (Yancey 1993) as it boosts the animal's immunity and reduces the dependability on antibiotics. Lacticin 3147 is a broad spectrum bacteriocin; produced by *Lactococcus lactis* is bactericidal against a range of mastitis causing *Streptococci* and *Staphylococci* (Ryan *et al.* 1998). The other approach towards the

control of mastitis is genetic manipulation by incorporating protective genes against mastitis into the genetic code of dairy cows. A revolution was made with the development of the first transgenic cow clone “Annie” in the year 2000, having mastitis disease resistance (Suszkiw 2001). But this approach is not acceptable under the organic livestock production systems.

The disease can be tackled either by minimizing the mastitogen or by stimulating the host immunity. Elimination of pathogen requires both the effectiveness of antimicrobial drugs and optimum functioning of the defense system. One possible approach to control mastitis involves manipulation of the host defense mechanisms. Hence, recent strategies aimed at improving the immune cells of diseased udder during immunosuppressive stages would greatly impact the ability of the animal to resist pathogenic infection (Mukherjee *et al.* 2005). Medicinal plants and their byproducts have greatly contributed for the treatment of various kinds of diseases of man and animals since time immemorial. These natural products, including those derived from higher plants have contributed greatly to the development of modern therapeutic drugs.

The World Health Organization (WHO) has recommended to all member countries to actively promote native medicines of their respective country and initiate steps to conserve medicinal plants. The WHO emphasizes integrating traditional health care facilities (Kamboj 2000). The use of conventional plant products described in ancient literature, suffers in modern medicine from the fact that scientific evidence and explanation are lacking in most cases. The herbal medicines possess certain advantages being non-toxic, efficacious, cultural acceptability, lesser side effects (Kamboj *opcit*), and act selectively enhancing body resistance. Herbal preparations containing honey suckle flower, *Chrysanthemum morifolium*, *Citrus reticulata* are also used in preventing mastitis (Jiang *et al.* 1994). Other medicinal plants like *Houttuynia cordata*, *Echium* spp., *Leptospermum scoparium* (Hu and Du 1997, Molan 1996) are also studied in bovine mastitis.

Organic Best Management Practices (OBMP) to Tackle Mastitis

Controlling mastitis without antibiotics or with least side effects is challenge specifically under the organic management of livestock. Thus, the best way to start with would be to document organic best management practices for mastitis prevention and control, best suited particularly to organic dairy farming practices.

There are some common practices for prevention and control of mastitis in both conventional and organic livestock management systems. For instance, hygiene is essential for breaking the cycle of disease. The mastitis control programme should essentially be handled by qualified professional staff /veterinarian. For prevention,

attention has to be paid to contamination and control measures at farm level, viz animal sheds and environment, animal itself, milker and milk routine, milking equipment, storage and transport etc. The animal shed is one of the main sources of contamination. At the same time, however, a good shed protects against micro-organisms as it keeps out other animals, people, wind, rain and excessive heat, all increasing the danger of contamination. Mud, urine, faeces, and feed residues should regularly be removed from the shed. The shed should have proper drainage, sufficient light and ventilation. In very wet areas, sprinkling slaked lime over the surface helps to dry it out quickly. The milking area of the shed needs special hygienic attention. The floor of the milkshed should be swept with clean water, and disinfected with one percent bleaching powder solution. Facilities should be provided for a sufficient supply of safe and potable water for drinking, washing udders and flanks of the animals, utensils and milkers' hands etc. The skin of the animal provides a large surface for possible contamination. Long hairs on the flanks, hind legs, tail and udder should be clipped at frequent intervals. If washing of animals is not practiced regularly as is observed in most cases, at least grooming of the animals should be done to keep the hair and dust away from milk. The udder is the part of the animal nearest to the milk and needs to be washed before each milking, and dried with a clean cloth or towel.

In many developing countries including India, knowledge of hygiene is often not sufficient. One of the most important support-services regarding clean milk production is "Extension-Education". The ultimate aim of this service should be to develop the awareness amongst the milk producers towards cleanliness of milk shed, clean milk production and animal health care. These services should be organised at the village level and main thrust should be given to empower the women members who do the most of the animal husbandry related jobs especially the cleaning, feeding and milking comes under their domain in rural areas of India. The agencies involved with dairy development in India are currently emphasizing on the clean milk production for which many training and demonstration programmes including cash incentives for clean milk production are currently in operation nationwide. The role of livestock extension educational efforts further goes up with the evolving systems like organic livestock production. Once, a farmer has taken care of cleanliness and hygiene, and mastitis is still persisting, he can look for Indigenous Technical Knowledge and alternative therapies to deal with the problem.

Indigenous Technical Knowledge (ITK)

Substantial Indigenous Technical Knowledge (ITK) or traditional/indigenous practices are in use for many different ailments of man and animals all over the world particularly in developing countries, with little to significant positive effect on treatment. As per the standards of organic production, however, it is not allowed

to use such ITK without first standardising their effects including the side effects following thorough scientific procedures. Therefore, it is important to validate indigenous practices before these are recommended for use in organic dairy farms in particular. For mastitis, many traditional practices are in use in various parts of the developing world including India, where a great variety of ITK is used for mastitis control. Such practices, however, need to be properly collected, documented, validated and then made available for large scale use by the farmers (Mukherjee and Chander 2005).

Herbal Therapies

Some herbal preparations have shown promising results against infectious agents, especially in context of Mastitis in dairy herds. If standardized, these preparations may prove to be a boon to organic dairy farmers. Many plants are used for the treatment of bovine mastitis in ethnoveterinary practices, like *Azadirachta indica*, *Zinziber officinale*, *Curcuma longa*, *Piper nigrum*, *Ocimum sanctum*, *Eclipta alba* and *Fumaria indica pugsley*. However, these plants documented in the literature as the possible therapeutic means of bovine mastitis need to be scientifically validated. Thus, in recent years, major steps have been undertaken for collection, documentation and validation of medicinal herbs used in indigenous traditional practices (Mukherjee 2005). Many herbal preparations are commercially available for the treatment of mastitis, like Dermanol, Mastilep, Wisprec, Titali-M, Golden udder and Udder mint etc., but limited success could be achieved when they are used as adjunct therapy in clinical mastitis. But, they were found effective against bovine sub clinical mastitis. The medicinal herbs documented in Indian System of Medicine and Ethnoveterinary practices are being now scientifically validated to develop possible alternative means of therapy against bovine sub-clinical & clinical mastitis. Given below are some of the examples, where, the clinical trials of some medicinal herbs gave highly promising results, whereas, some plants failed to cure the disease as described hereunder:

Chenopodium album

Fermented leaves of *Chenopodium album* were tested for the treatment of bovine mastitis. It is a common weed, commonly known as lambsquarter (wild spinach) or *bathua* often used as vegetable. Literature reveals presence of Vitamin C, saponin, tannins and flavanoides in the green leaf. Local farmers in northern India reported that the plant material is used for reducing udder inflammation (Mukherjee and Chander 2005). On- farm trials conducted in lactating cattle and buffaloes revealed reduction in swelling, healing of ulcer like lesions on the teat, but the herb failed to treat clinical mastitis.

Azadirachta indica

Azadirachta indica known as margosa or Neem in India, is one of the most versatile medicinal plants having wide spectrum of biological activities. *Azadirachta indica* possess antipyretic, antimicrobial, antifungal and antiviral properties (Talwar *et al.* 1997). The seed kernel hydro-methanolic sterilized extract at standardized dose was infused via teat canal in mastitic cows twice daily for 7 days. The results of the therapeutic trial revealed 55 % clinical recovery against clinical mastitis.

Curcuma longa

Curcuma longa is a perennial herb. In Indian system of medicine, the turmeric powder is used against biliary disorders, anorexia, coryza, cough, diabetic wounds, hepatic disorders, rheumatism and sinusitis (Ammon *et al.* 1992). *C. longa* extract was given by intramammary route twice daily at the dose rate of 1 g for 7 days in mastitic cows. The extract of the herb showed 55.55% clinical recovery rate between 7 to 10 days post treatment.

Phyllanthus emblica

P. emblica has been used for anti-inflammatory and antipyretic treatment by rural folks (Burkill 1966). *P. emblica* extract was given by intramammary route twice daily at the dose rate of 1.5 g in mastitic cows for 7 days. The therapeutic efficacy of the herbal extract was adjudged on the basis of SCC and bacterial isolation. *P. emblica* extract showed 66.66% clinical recovery, the recovery initiated between 7 to 10 days post treatment.

Homeotherapy

The role of Homeopathy in organic livestock health management has been discussed separately in this book. However, some remedies concerning mastitis are mentioned here under as an indication:

- Homeopathic remedies- (Martini *et al.* 2001)

Aconite 6x- one dose every half an hour- 6 doses

Belladonna IM-when udder hot, red and sensitive to touch – one dose every hour – 4 doses

Bryonia alba 30 for swollen hard udders

Acute: 1 dose every 4 hours, 4 doses

Chronic: 1 dose, 2 times /week for 1 month.

- Stripping every two hours in an acute case

Vitamin C: 50-100 cc of liquid injected under skin or into milk vein in an acute case.

The mechanism of homeopathic cure is not well understood in case of mastitis in particular. The homeopathic remedy used in some trials in Germany and Switzerland was not able to kill bacteria or any other micro-organism directly (Walkenhorst 2001). It has been suggested that homeopathy could stimulate defence mechanisms and self-healing processes. It has also been maintained that an organism that is not able to react to homeopathy due to poor environment or high genetically based performance, has little chance of benefiting from homeopathic therapy. The defence mechanisms of the udder are not very efficient, especially when milk yields are high. Therefore, mastitis is probably not a good candidate for homeopathic therapy (Walkenhorst 2001). But, the research is still going on at many institutions globally to see utility of Homeopathy in treatment of animal diseases including mastitis especially in context of organic livestock production.

Antibiotic Use

Prevention is better than cure; hence, efforts should be made to prevent diseases by following hygienic practices in the dairy farms. If disease still occurs, alternative but tested methods should be applied with the advice of qualified veterinarians and then only one should move towards using conventional medicines like antibiotics etc which are harmful and hence, should be avoided as far as possible but not at the cost of the suffering of the animals for longer durations. Though antibiotics are generally discouraged in organic production systems, but when the mastitis is not controlled by alternative therapy, it becomes essential to go for antibiotic therapy. However, extreme caution is required since routine use may lead to disqualification of the animal or the entire herd for organic production. The advice of professional advisor like veterinary doctor should be adhered to regarding usage of antibiotic and other health products, or any other relevant procedural modification like mastitis vaccination etc. The dairy farmers often incorrectly use expensive antibiotics, by applying them against non-sensitive organisms. This often leads to many so called “antibiotic failures” and apparent drug resistance, etc. Therefore, (a) the organism(s) should always be identified, (b) specific antibiotic(s)-if no other alternative available recommended for control should be identified as well, (c) The recommended level and length of treatment should be followed, (d) In case of unsuccessful therapy, the milk samples should be reevaluated for the causative organism(s) and their antibiotic sensitivity, (e) Special disinfection routines at each milking period should be strictly observed.

To sum up, we can say Mastitis is a universally prevalent disease of dairy animals, mostly controlled by antibiotics. However, antibiotic use is restricted under the

organic dairy management systems, where, preventive measures like hygienic practices, alternative therapies like Homeopathy, Chinese system of Medicine, validated herbal veterinary medicines, and Indigenous practices are preferred. Therefore, a knowledge pool is required for valid herbal treatments, ITK, and good managerial practices so that mastitis in dairy herd is prevented and controlled more effectively through non-antibiotic measures. A long-term healing success with any mastitis therapy appears elusive. Mastitis sanitation and preventive measures, especially optimisation of the production system with the type of cows in a particular herd, should therefore be the approach of choice in organic systems (Walkenhorst 2001). Similarly, for other diseases too we need to have a strategy to combat them in ways compatible to organic systems.

Researchable Issues in Organic Livestock Farming

The Green Revolution, more specifically the increased use of its associated technologies like high-yielding varieties, chemical fertilizers, feed additives, mineral and vitamin supplements, hormones, pesticides, weedicides made India leader producer of many agricultural commodities including becoming number one milk producer in the world. Indian farming situation offers good potential for promotion of organic livestock farming too due to its rich indigenous livestock wealth and farmers with continued traditional farming practices. The progress and future of organic livestock farming, however, largely depend on generation of new technologies compatible to organic standards, guidelines suitable to different agro-climatic conditions under the prevailing situations as well as the utilization of indigenous technical knowledge after proper validation.

Generally looking at organic agriculture developments in many countries, efforts have been mainly on crop production than on livestock farming. Whereas, European countries have gone ahead to promote and conduct research on various aspects of organic livestock production under their conditions, little has been done in tropical countries. Organic livestock farming is still evolving and it will take some time to develop to be sustainable on its own using organic methods without depending on artificial or chemical substitutes for the natural products as used in conventional livestock production. This underscores the need for more research on alternatives including on feeds and feeding practices suitable and compatible to organic management practices and standards. For instance, many a time people question how animal production can be done efficiently under organic management when we are not supplementing some of the routinely used items like synthetic amino acids considered essential in poultry and pig feeding. For this, alternatives need to be worked out so that production and animal do not suffer. The production factors cited as reasons to supplement limiting amino acids may be addressed by changes in animal and land management practices, novel feed sources, and better feed handling. Methionine can be sourced from natural sources, since it is also found in

naturally occurring proteins. Some coarse grain cereals like finger millet contain high amount of methionine, which may be popularized as poultry meal alongside human diet. Alternatives include improved pasture management, a balanced supplemental ration composed of organic grains, legumes, and oilseed meals. Temporarily confined poultry can be fed practical organic corn/soybean ration. Depending on how other parts of the standards evolve and market conditions, novel organic products can be developed as supplements. Likewise other alternatives need to be researched and developed for the organic livestock production.

National Organic Program (NOP) of United States Department of Agriculture (USDA) announced on 18 September 2008 that the agency has decided to implement a recommendation from the National Organic Standards Board (NOSB) to extend the use of synthetic sources of methionine in organic poultry production until 1 October 2010. The NOSB made a recommendation on this topic during its May 2008 meeting, after considering public comments from organic poultry producers. The producers explained that, in spite of research on multiple alternatives to the use of the synthetic methionine in poultry feed; they had not yet been able to identify practical alternatives from natural sources. Had the NOP not implemented this extension, the use of synthetic methionine would have been prohibited as of October 1, 2008. NOP stated that its goal in allowing the extension is to ‘provide the organic feed sector with the time to create sufficient supplies of wholly natural substitute products’ (Coody 2008). This explains the importance of standards and requirements which are not only strict but also evolving, making it further challenging to developing country researchers in particular that they need to be continuously updated about these requirements.

The development of organic livestock farming systems require an interdisciplinary approach to research on aspects like veterinary management, development of systems for different species, identification of proper management practices suitable to organic systems, and economic viability of these practices. The extension functionaries at different levels shall also need to be attuned to the change in farming concept, i.e. input intensive livestock farming to on-farm input utilization. Further experiments and on-farm research are needed to strengthen and encourage organic farming systems. Research systems at national, state and region levels are expected to concentrate effort on the adaptive and applied research, as well as development and testing end of the chain. Since organic farming systems are based on the functional dynamic interaction between soil, plants, animals, humans, ecosystems and environment, an important premise for research in organic farming is to develop approaches that are as holistic as possible.

Most of the veterinary drugs used in conventional production are prohibited under organic systems, so health care protocols need to be developed for each species, including research on alternative and complementary methods of disease prevention, effective non-chemical parasiticides, and preventive health care

practices. Development of rations and feeding strategies to reduce the incidence of harmful pathogens and breeding programmes for organic animals are needed. Improvements in animal housing, husbandry and better understanding of mixed crop and livestock systems are also important. Especially key in arid and semi-arid areas is the development of feeding strategies that provide adequate nutrition and high livestock productivity given the environmental constraints. Most of the research on organic livestock is occurring in temperate areas. Though arid areas are largely dependent on livestock, little research is being done on organically raised livestock.

The following illustrative areas need the focus of attention by researchers at different levels.

General

- The production practices of small scale farmers in contrast to standards of organic livestock production.
- Economic feasibility of organic livestock farming practices under Indian conditions.
- Economic impact of organic farming in terms of production and marketing.
- Impact of conversion period on quality of food.
- Evaluation of the effect of conventional livestock practices on public health hazards.
- Epidemiological studies to evaluate health risk factors in conventional production.
- Do the regulations in force on organic production meet the demand of sustainability?
- Do the small ruminants in organic production systems satisfy the sustainable conditions?

Cattle/Sheep/Goat

- Suitability of qualitative traits of Indian cattle and native breeds of sheep and goat for organic farming.
- Identification of breeds those are adequate to the available nutrient supply within the organic framework.
- Developing selective breeding strategies to improve resistance and productivity.
- Performance of different breeds of cattle, sheep and goat in organic systems in comparison to their genetic potential to set organic breeding targets.

ORGANIC LIVESTOCK FARMING

- Identification of suitable crosses for production of desirable dairy bull calves with due consideration of varying conditions in different production systems and individual farms.
- Development and evaluation of preventive measures to be followed in organic systems towards mastitis problem in high-yielding breeds, testing the efficacy of homeopathic treatment as well as phytotherapy measures towards mastitis control in organic farming.
- Appropriateness and suitability of nature of vaccines in organic livestock systems.
- Identification of alternative therapies and system level strategies for parasite control in all species.
- Formulation of strategies to a livestock farm in terms of bio-security, preventive husbandry options and management practices.
- Role and contribution of organic livestock farming towards sustainability of the ecosystem.
- Studies on impact of organic dairy farming towards ecological sustainability.
- Appropriateness of housing conditions in terms of animal welfare and animal behavior.
- Formulation of feeding rations adapted to organic systems and development of forage conservation methods adapted to organic system.
- Development of efficient management systems of grassland and forage conservation adapted to organic systems.
- Development of appropriate housing systems suitable to organic farming.
- Research into the management and husbandry of dairy goat and sheep systems under organic specifications.
- Role of diversified livestock rearing/mixed species farming in reducing parasitic burden.
- Production efficiency of the organic livestock systems in the natural/ agro-forestry areas.
- Impact of changing husbandry systems on farmers' managerial ability like welfare implications of automated or free range systems with less human-animal interactions need to be studied.
- Need of quantification of the benefits of good management practices of the farmer like financial benefits, reduced disease incidence, etc.
- Development of 'codes of practice' for organic livestock producers.

ANIMAL HEALTH MANAGEMENT IN ORGANIC SYSTEMS

- Effect of castration on growth rate of calves on organic farms.
- Formulation of feeding rations adapted to organic systems under Indian conditions.
- Identification of natural sources and feeding regimes in order to replace synthetic vitamins and amino acids in the rations, particularly for monogastric animals and synthetic vitamins for organic dairy cows.
- Research into biological efficiency and environmental impact of feeding systems.
- Research into innovative feeding and rearing systems for young stock in all organic livestock systems.
- Development and formulating methods to enrich the nutrient source of forages as alternate to concentrates.
- Forages rich in metabolites, i.e. bioactive forages need to be focused in feeding aspects of livestock.

Piggery

- Need of specific research into organic pig production with regard to meat quality, boar taint/need for castration, leg problems, mothering ability, etc., in order to establish to what extent breeding can address these problems.
- Identification of optimal weaning age for the health and welfare of piglets under specific farm conditions and identification of breeds those are capable of suckling to this period.
- Adequate control of parasite burdens, management of salmonella etc.
- Identification of feasible alternatives to artificial amino acids.
- Pork quality, immune status of animals and sow's fertility in organic systems.
- Ration formulation for finishing steers.

Poultry

- Research into poultry breeding in order to set sustainable standards for poultry breeding systems.
- Potential of backyard poultry systems for development of organic poultry production system.
- Measures to reduce /eliminate the behavioral problems in poultry like feather pecking and cannibalism.

- Identifying/Investigating alternatives to artificial amino acids especially synthetic methionine (potato protein, soured milk powder, organic soyabean meal, finger millets).
- Establishing appropriate production levels without use of artificial amino acids, meeting welfare measures from organic diet.
- Need to develop standards and breeding practices for organic poultry production, in order to avoid the inherent animal welfare problems that are prevalent in conventional poultry systems.

Veterinary Management

- Development of a health plan as an approach to positive animal health and welfare in organic production.
- Development of health and welfare indices and their assessment to their usefulness to all stakeholders.
- Research to develop homeopathic therapy and its practical use in animals.
- Development of effective phytotherapy measures towards helminthes and parasite control in organic livestock production systems.
- Effectiveness of homeopathic medicines in disease control in organic production systems and documentation of clinical effects of homeopathic treatment of diseases.
- For effective control of parasites proper understanding and estimation of situation at farm level.
- Understanding the epidemiology of internal parasites in monogastric animals under free range conditions.
- Role of bioactive forages in minimizing the parasitic infections.
- Action research project on Organic health planning at farm level.
- An understanding of soil, plant and animal interactions and the range of realistic alternative parasite control techniques particularly where land management options are limited.

Livestock Products Technology

- Identification and development of chemical free preservatives and processors of livestock products for consumption.
- Evaluation / assessment of Quality of milk in organic production as compared to conventional animal production.

- Quality of meat of goat and sheep finished on roughage based diets.
- Quality of meat in castrated organic farms.
- Research into the practicalities of producing non-castrated bulls for organic meat production.
- Qualitative differentiation assessment between conventional and organic livestock products.

Extension

- Knowledge and attitude of livestock farmers towards organic livestock farming.
- Knowledge and attitude of veterinarians towards organic livestock management and its impact on organic animal husbandry.
- Perception of veterinarians on effectiveness of preventive health strategies in organic systems.
- Development of training materials for farmers on home-mixing diets for different species.
- Development of organic livestock production systems that are fully integrated with other production systems on the farm and that are focused on providing animal's access to natural behavior as part of the system.
- Development of a management tool for farmers and advisers in their efforts to improve animal health and welfare on the farm.
- Awareness and preferences of consumers towards organic livestock products.
- Participatory research into farmers attitudes concerning recording, information gathering and information based decision support at farm level is needed to identify approaches that would be acceptable to farmers.
- Innovative and participatory research on health planning like demonstration farms, study groups, socio-psychological studies (e.g. to establish what makes farmer willing to accept and adopt advice).

Animal Welfare

- Development of holistic quantification methods for animal welfare on organic farms.
- Quantification of the impact of organic management on animal welfare at farm level in order to maintain consumer confidence and also to help organic farmers to maintain high welfare standards on their farms.

- Quantification of the impact of Organic management on animal welfare at farm level.
- Identification and clarification of the problem areas in animal welfare specific to Organic farming systems.
- Effect of mutilations like castration, dehorning, tail docking on animal welfare in organic farms.

Above mentioned topics are not exhaustive list but only a few potential areas for research indicated to the researchers, who might find it worth to initiate research in organic production. With advancing times, the research might generate data for comparison and improving the sustainability of organic livestock production systems. The interest in organic farming has opened new vistas for research, on which the scientists may find worth getting involved towards creating new knowledge.

One of the strengths of the organic farming system is the view of the whole farm as an organism, seeing it in the context of environment and internal harmony. This should lead to a natural attempt to make all research efforts more holistic: when working with a whole system, it is inadequate to look at only a fraction. Whilst it is impossible for one researcher or one research team to look at ‘everything’, it should be possible to define the place, relations and relevance of each single research result in a context and in the entirety (Vaarst 2000).

A Successful Organic Livestock Farmer

Organic livestock farming can be done successfully, if anyone is having following attributes:

1. Willing to learn and take risk, in new ventures likes organic farming.
2. Owning land good enough to raise number of animals as per the carrying capacity, wherein, livestock can be housed and maintained as per prescribed space requirements, fodder could be grown and also animals let loose for grazing and exercise, at least for a few hours in a day (4 h.). S/he considers that organic farming can be done sustainably under integrated crop-livestock production systems.
3. If a farmer is literate, can read and write would help him follow the literature on organic farming, leaflets, folders, manuals etc.
4. Willingness to participate in training programmes on agricultural development issues including organic farming.
5. Having an interest in diversifying the farm activities by including more crops, number of livestock species etc. on farm.
6. A willing person to not to inflict cruelty on animals and ever ready for adoption of animal welfare practices. S/he gives humane treatment to animals,

- keeps animals and their dwellings clean, comfortable and germs free. Avoids taking work from sick and injured animals. S/he does not discriminate or neglect old and infertile animals at his/her farm.
7. Who maintains written records of farm activities, making available the records of inputs used, breeding records, treatment details, feeding schedules, whenever asked.
 8. A farmer who updates himself about latest Good Agricultural Practices and other similar aspects towards ensuring quality of agricultural products.
 9. S/he ensures that his children attend schools and does not employ his minor children in agricultural activities at the expense of their educational activities as far as possible.
 10. S/he does not discriminate between male and female labourers in matters of wages and other benefits.
 11. S/he largely avoids taking services of quacks for treatment of animals, but actively seeks professionally qualified veterinary health care whenever animals face health problems.
 12. S/he tries to exploit on farm resources as far as possible, reducing his/her reliance on market purchased inputs.
 13. S/he prefers to work through hands, minimizing the use of fossil fuel driven machines.
 14. S/he grows green fodder for livestock using available on farm resources to the extent possible. He offers animals' clean and organically grown fodder and feeds.
 15. S/he tries to seek professional assistance to raise his livestock as per the prescribed norms through suitable agencies (government, private sector, NGOs, cooperatives).
 16. S/he promotes indigenous breeds, prefers local but safe and valid practices of health management, and encourages the practice of dry dairy.
 17. S/he does not use chemical fertilizers/agrochemicals on his/her farm. S/he doesn't burn crop residues and other agro wastes, but actively promote scientific animal waste management practices like, composting, biogas, vermin-composting and making bio-fertilizers and biomaterials from cow dung and cattle urine for improving soil fertility and controlling pests and disease of crops.
 18. S/he follows crop rotations, prefers leguminous crops, and tries to minimize practices which increases pollution.

19. S/he opts for soil testing to know existing fertility status of his/her farm and accordingly apply fertilizers.
20. Ideally, S/he is concerned for environment, ecology, soil, human and animal health, thus exercise caution, implements safety measures on his/her farm, follow a healthy lifestyle, takes good care of people and animals around him.

8

Record Keeping in Organic Livestock Production

The farmers in India as also in many other developing countries do not maintain written record of their farming activities. But, Indian farmers have amazing memory as far as their agricultural operations are concerned. If asked, they would tell when they did sowing, transplanting, harvesting or what they fed their animals in the previous year. Not keeping record is almost a rule in Indian subsistence farming systems. But, the present day commercial farming operations are becoming more and more business oriented than yesterday's farming operations. Being a good producer is no longer good enough to remain in business. The key to becoming a small successful farmer today is being a good producer as well as a good financial manager. It is very important for farm managers to keep complete and accurate records in order to make informed management decisions that will help maintain or improve farm business profitability. Record keeping systems have four functions:

1. To assist in reporting to the creditors, other farm asset owners, and to others who have an interest in the financial position of the farm business.
2. As an indicator of progress.
3. As a diagnostic tool for identifying strengths and weakness.
4. As a planning tool.

Records can also help the farmers/farm manager plan and implement farm business arrangements and do estate planning, determine what the efficiencies and inefficiencies are, measures progress of the business, and plan for the future. There are many farm record systems, ranging from simple and accounting systems using pencil and paper to sophisticated double-entry computer accounting systems, which require computer operations. It should not only meet the accounting and planning needs of the farm operation, but it should also satisfy other outside reporting requirements. A good record keeping system is one that will provide the necessary information and provide the information when needed. It will furnish the necessary information for understanding the activities of farming operation. Under the subsistence operations, where farmer maintain 2-3 animals, it look somewhat irrelevant, but it makes sense if records are maintained to know the economics of production system.

ORGANIC LIVESTOCK FARMING

Organic livestock farming requires the maintenance of a good up-to-date record of all the farm operations from the farmer for certification purpose. A certified livestock farm operation must maintain records concerning the production, harvesting, and handling of agricultural products that are intended to be sold, labeled, or represented as “100 percent organic,” “organic,” or “made with organic (specified ingredients or food group(s)).” The certified operation must make such records available for inspection and copying during normal business hours by authorized representatives of the certifying agency. Such records must:

- Be adapted to the particular business that the certified operation is conducting;
- Fully disclose all activities and transactions of the certified operation in sufficient detail as to be readily understood and audited;
- Be maintained for not less than 5 years beyond their creation; and
- Be sufficient to demonstrate compliance with the Act and the regulations in this part.

The records are needed to verify compliance to the organic livestock production standards. Most of these records must be kept by the producer and reviewed by the inspector during the organic inspection. It is the responsibility of the producer to check labels and ingredient information to ensure purchased feed, feed supplements and feed additives, health care products and sanitation products that they meet the requirements of the organic certification programme.

It should be noted that these specific records are not necessarily required for organic certification. But they can aid producers in developing their organic livestock production and verifying compliance, dramatically shortening the inspection time, and assisting the certifying agent to assess compliance. It is also assumed that these records can assist producers to make management decisions that can increase profitability. Inventory records could be used to track specific products currently in use and the date they were approved by the certifying agent. These include feed supplements and Additives Inventory, Health Care Products Inventory, and Sanitation Products Inventory. These records can decrease time spent by the producer preparing for certification or updates and certifying agent in assessing products. They clarify what products have been approved by the certifying agent. The producer would not need to send in labels year after year. Redundant information need not be collected by the inspector.

An organic livestock farmer is expected to maintain following types of record:

- 1. Animals Requested for Certification:** This record clarifies the type and number of animals on the farm that are actually requested for organic certification to help verify the type of animals permissible under organic livestock farming.

2. **Breeding Record:** This record verifies implementation of breeding guidelines. The farmer must keep breeding records for animals used to produce organic slaughter animals and organic dairy products, and breeding stock that may be sold as organic breeding stock or organic meat products. In the event that synthetic parasiticides are used, this form tracks the date of use to verify compliance with the guideline laid for such requirements.
3. **Source of Purchased Animals:** This record verifies that purchased animals are certified organic, or provides verification that any non-certified organic breeding stock was purchased prior to last third of gestation. If the farmer breeds his own replacement dairy cows or slaughter stock on the farm, he does not need to keep this form.
4. **Planned or Actual Organic Feed Ration Record:** This record verifies the guidelines given for organic livestock feed. All feed must be certified organic and meet nutritional requirements of the animal, including vitamins, minerals, protein, and/or amino acids, fatty acids, energy sources, and fiber (ruminants). Vitamins, minerals and amino acids are defined by the organic livestock farming standards as feed supplements or feed additives. Feed information on males used solely for breeding does not need to be verified. If the farmer is requesting certification for the first time and has not begun feeding organic feed, he must provide information on his planned rations. The farmer will have to submit this information with his certification request for organic livestock. This feed ration record includes both purchased and feed crops grown on the farm.
5. **Purchased Organic Feed Record:** All feed must be certified organic. Use of animal drugs and hormones to promote growth is prohibited. Plastic pellets for roughage are prohibited. Mammalian or poultry slaughter by-products are prohibited to be fed to mammals or poultry. This record can also serve as a storage record to eliminate the use of Organic Feed Storage Record.
6. **New Organic Dairy Herd Feed Record:** This is used only for new dairy herds. It is used to calculate percentages of organic vs. non-organic feed rations. When an entire, distinct herd is converted to organic production, the herd must be fed a minimum of 80% certified organic or certifiable feed for 9 months, followed by 100% organic feed for 3 months. The farmers' Organic Farm Plan must include field history records for feed crops grown on his farm. Pasture history information is contained in the Outdoor Access and Pasture Record or on the Field History Record. The farmer will have to include ration information on feed supplements and additives, such as salt or mineral mixes. If the feed ration changes seasonally, he will have to indicate actual dates ration was fed.

7. **Feed Supplements and Additives Inventory:** Non-synthetic and synthetic substances allowed under some standards may be used as feed additives and supplements. Supplements and additives are provided for adequate nutrition and health maintenance for the species at its specific stage of life. Use of feed additives and supplements in violation of the relevant food Act is prohibited. This record can assist the producer and certifying agent to track use of approved feed supplements and additives. The producer must keep this ongoing list to show specific products currently in use and the date they were approved by the certifying agent. It is the responsibility of the producer to check labels and ingredient information to insure feed supplements and feed additives meet the requirements of the organic livestock standards.
8. **Organic Feed Storage Record:** This record can be used to verify harvest of feed crops, storage of purchased feeds, and/or proper handling of organic feeds, feed supplements and additives to prevent co-mingling or contamination. If the farmer is a poultry producer and only purchase organic feeds, he may choose to keep storage information on the Monthly Flock Record.
9. **Organic Livestock Outdoor Access and Pasture Record:** This record can be used to show that pastures/paddocks are used to provide outdoor access, shade, exercise, fresh air and direct sunlight, as well as access to pasture for ruminants. This form can also be used to monitor outdoor access for poultry operations.
10. **Health Care Products Inventory:** Vaccinations are allowed. Hormones for growth promotion, use of synthetic parasiticides on a routine basis, or animal drugs are prohibited. The organic livestock standards currently allows electrolytes (without antibiotics), glucose, iodine, magnesium sulfate, parasiticides (with specific annotations for use), biologics/vaccines, iodine (topical treatments), lidocaine (local anesthetic, requires 90 day withdrawal period after administration to slaughter livestock or 7 days to dairy animals), hydrated lime (not for cauterizing physical alterations or deodorizing animal wastes), mineral oil (topical use and lubricant), procaine (local anesthetic, requires 90 day withdrawal period after administration to slaughter livestock or 7 days to dairy animals), and copper sulfate. This record clarifies exactly what health care products and vaccines are in current use on a livestock operation.
11. **Sanitation Products Inventory:** The following are allowed as disinfectants or sanitizers: alcohols, ethanol (disinfectant and sanitizer, not as a feed additive), isopropanol (disinfectant only), chlorine materials, chlorohexidine (veterinarian conducted surgical procedures, and teat dip when alternative germicidal agents or physical barriers have lost their effectiveness), iodine,

hydrogen peroxide, phosphoric acid (use as equipment cleaner only, provided that there is no direct contact with organic livestock or land).

- 12. Individual Organic Animal Health Record:** Preventive health care practices must be used, including species selection, nutritional feed ration, good housing, good pasture, exercise, physical alterations and vaccines. Antibiotics, growth hormones, and synthetic parasiticides on a regular basis (never to slaughter stock) are not allowed. All drugs used must be allowed by relevant food and drug act. The farmer cannot withhold medical treatment to preserve organic status. All livestock treated with prohibited substances must be clearly identified. If the farmer adds breeding information, this record could also be used as a breeding record. This record is clearly not used for poultry operations.
- 13. Organic Egg Layers Monthly Flock Record:** This record documents information about a specific poultry flock as well as organic feed, mortality of hens (a guide to health problems), use of health care products and/or vaccinations, outdoor access and egg production. This can be modified to meet producers' specific needs.
- 14. Organic Meat Poultry Flock Record:** This record documents information about a specific poultry flock as well as organic feed, mortality of chickens (a guide to health problems), use of health care products and/or vaccinations, outdoor access and egg production.
- 15. Organic Livestock Slaughter/Sales Summary:** This record can be used to track the slaughter and sale of individual animals or groups of animals. Small operations that sell packaged meat in small amounts can modify this record to keep an inventory of various meat products in the freezer. For instance, the record would apply to one animal or group of animals that were slaughtered at the same time.
- 16. Monthly Organic Egg Packing Record:** This record tracks the packaging of organic eggs, including the number of eggs that were cracked or otherwise damaged.

The above mentioned record requirements may appear too complicated but necessary. The individual farmers or certification agency may simplify the record sheets (Annexures), considering the local conditions and convenience of the farmers with the mutual agreement of farmer and certification agency responsible for the given organic production unit. In general, Indian organic livestock farmers are expected to essentially maintain certain records (Annexure).

9

Organic Agriculture Scenario in India

Animal welfare, stress free life to animals including prevention of cruelty against them, food hygiene and food safety, sanitary and phytosanitary (SPS) requirements, HACCP, ISO certification, OIE guidelines on animal welfare are some of the issues which have become important in modern conventional systems of animal production as also under the organic production management of livestock. These issues calls for a development of a human society that is not only more humane but also aware, educated and concerned about health, hygiene and welfare of the animals. Is it a task of only the academic and research institutions and a few NGOs working for animal welfare to spread awareness on such issues? Or the society at large including the many other socio-cultural and religious institutions, viz places of worship, Gaushalas/Pinjarpoles, schools/*madrasas*, youth welfare associations should shoulder the responsibility towards these issues for rapid understanding among masses for animal welfare and sustainable livestock production. It is going to be increasingly difficult to sustain in globalized situation especially after the implementation of WTO agreements on fair trade where all the issues mentioned above concerning livestock production have strong implications. Organic agriculture, therefore, gradually finding the place in government policies, farmers' field, market and export situation in India as elsewhere in the world.

The cultivated area under organic production in India grew from close to 1.02 million hectares in 2008 to 1.18 million hectares in 2009. Whereas, forest area reached 3.36 million hectares up from 2.79 million hectares (Willer and Kilcher 2011). Further, India has the largest number of certified organic farms and organic farmers, which almost doubled from the 3,40,000 reported in 2008 to 6,77,257 in 2009. Currently, India ranks 7th in terms of total land under organic cultivation. India therefore is one of the most important suppliers of organic food to the developed nations. India is bestowed with lot of potential to produce all varieties of organic products due to its diverse agroclimatic regions. In several parts of the country, the inherited tradition of organic farming is an added advantage. This holds promise for the organic producers to tap the market which is growing steadily in the domestic market related to the export market.

The Government of India has implemented the National Programme for Organic Production (NPOP). The national programme involves the accreditation programme for certification bodies, norms for organic production, promotion of organic farming etc. The NPOP standards for production and accreditation system have been

recognized by European Commission and Switzerland as equivalent to their country standards. Similarly, USDA has recognized NPOP conformity assessment procedures of accreditation as equivalent to that of US. With these recognitions, Indian organic products duly certified by the accredited certification bodies of India are accepted by the importing countries.

Organic Agriculture: the Research Initiatives by the Government of India

Since 2003, the Indian Council of Agricultural Research (ICAR) is implementing a network programme on “Development of Technology Package for Organic Farming” to develop production packages, conducting applied and strategic research and documenting know-how in organic agriculture. Many ICAR institutes and State Agricultural Universities (SAUs) conduct research on various aspects of organic cereal and horticultural crops. The National Centre of Organic Farming was created in 2003-04 by the Ministry of Agriculture as a service provider for organic farmers. This Centre has six regional centres of about 100 staff each with the mandate of providing technical training and facilitating organic certification. The National Horticulture Mission scheme provides funds to State Horticulture Departments which in turn reach-out to farmers with regards subsidies, credit, planting material and know-how, including subsidies for organic agriculture. Organic subsidies were provided on a pilot basis (200 rupees per acre) till 2007 and credit schemes for organic agriculture are now being explored through the National Bank for Agricultural and Rural Development (NABARD). These initiatives have not covered livestock so far, but in future livestock may form an important component of organic agriculture research.

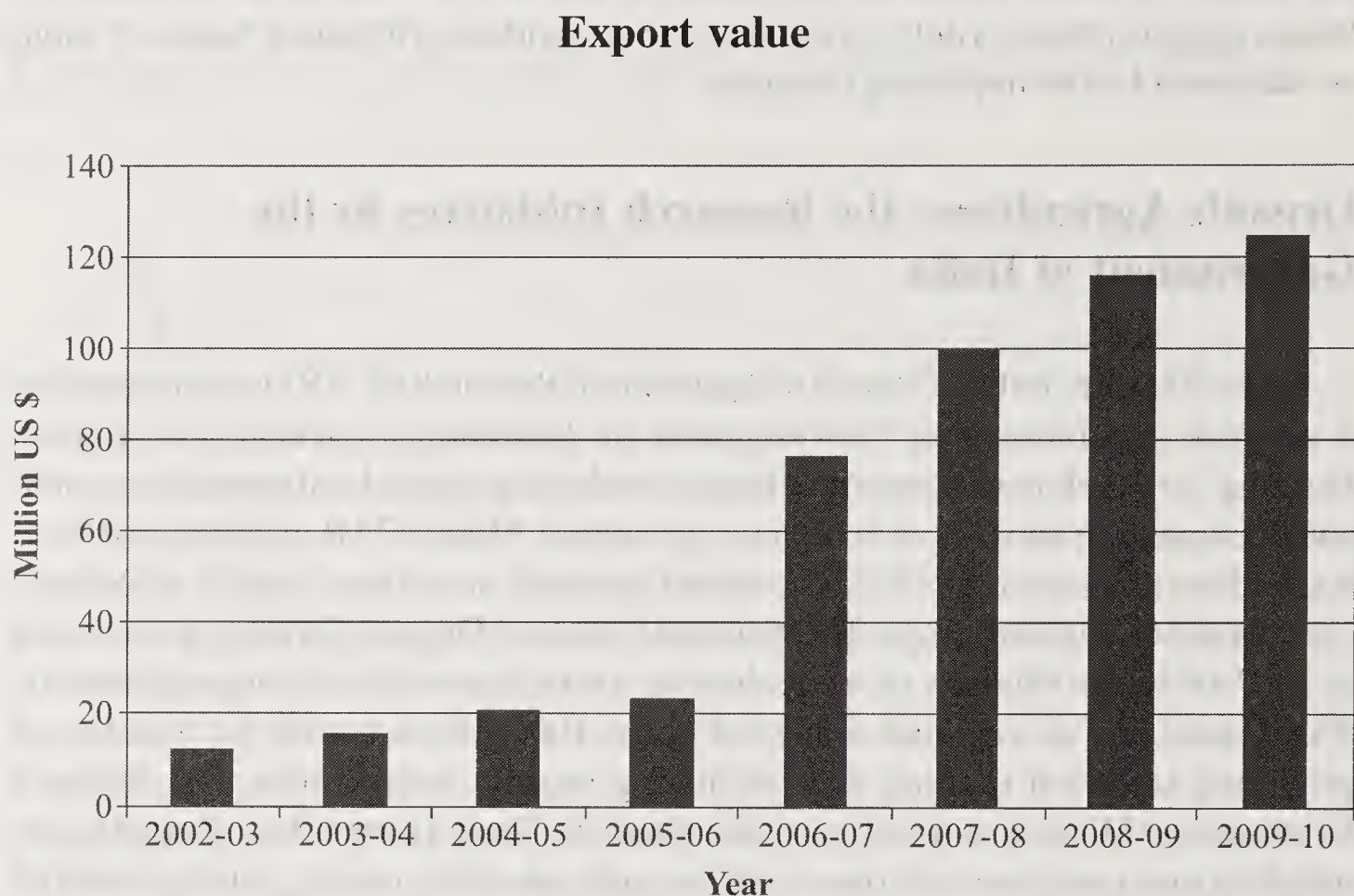
Production

India produced around 3,96,997 MT of certified organic products which includes all varieties of food products namely Basmati rice, pulses, honey, tea, spices, coffee, oil seeds, fruits, processed food, cereals, herbal medicines and there value added products. The production is not limited to the edible sector but also produces organic cotton fiber, garments, cosmetics, functional food products, body care products, etc.

Exports

Indian organic farming industry is estimated at US\$ 122 million and is almost entirely export oriented. According to Agricultural and Processed Food Products Export Development Authority (APEDA), a nodal agency involved in promoting organic agriculture, production and export of organic products has shown notable increase in India over last decade (Fig.1).

Fig1: Growing export of certified organic agricultural products from India (Gunnar 2011)



India exported 86 items during 2007-08 with the total volume of 37533 MT. The export realization was around 100.4 million US \$ registering a 30% growth over the previous year. Organic products are mainly exported to EU, USA, Australia, Canada, Japan, Switzerland, South Africa and Middle East. Cotton and Basmati rice lead among the products exported. We can say that organic agriculture is growing at rapid rate, not only in the developed countries but also in the developing world, with annual sales of about US \$ 54.9 billion. Organic market in developed countries has rejuvenated the agriculture sector in developing countries too. India has made significant strides in the matters of organic sector development. Some of the milestones India has achieved are given as under:

- National Programme for Organic Production (NPOP) launched in 2001.
- National Standards for Organic Production (NSOP) were developed in 2002.
- National Centre of Organic Farming was established at Ghaziabad in 2003.
- The cultivated land under certification is around 1.2 million ha (2007-08). Besides, 3 million ha under forest area certified for wild collection.
- Indian organic products are compliant to EU, IFOAM and USDA standards, thus, international recognition to Indian organic products.

- 22 APEDA accredited organic certification agencies are operating in India.
- Produced 3,96,997 MT of certified organic products in 2007-08.
- India exported 86 items in 2007-08 with the total volume of 37533 MT. The export realization was around 100.4 million US \$ registering a 30% growth over the previous year. The export figures further rose to US \$ 122 million in 2009-10.
- Save honey, no certified livestock product yet, but consumers are increasingly looking for quality, safety and taste in milk, milk products and meat.. which 'organic' assures!

India produce substantial quantity of milk, eggs, wool and meat, out of an enormous population of livestock and poultry. Yet, there was not even a single organic livestock product exported. However, India has opportunity to tap the potential of organic livestock product market in near future.

Problems in Development of Organic Animal Husbandry

While India is making concerted efforts to boost organic production especially of the high value commercial crops but the problems too are very serious restricting growth in organic farming. Some of the potential obstacles especially in context of the exports of livestock products are:

1. **Sanitary regulation-** Only a few developing countries are able to export even the conventional livestock products due to strict sanitary requirements imposed by importing countries. These sanitary regulations are further strictly monitored in case of organic livestock products. The GOI is taking initiatives in this regard by emphasizing the Clean Milk Production (CMP), Good Manufacturing Practices (GMP), HACCP, ISO certification, Good Agricultural Practices (GAP), best practices etc. These efforts would need to be further pursued strongly so as to improve access to international market for the Indian organic livestock products. This may be difficult but not impossible especially when some of the developing countries like Argentina and Brazil export organic livestock products to EU and USA. The efforts are needed on massive scale to improve hygiene and sanitary conditions especially at production, processing and packaging stages.
2. **Traceability-** Importing countries emphasize farm to table traceability and there is an increasing attention on this in recent times. It may be comparatively easy to trace the origin of products in western countries, where farms are large with high volumes of production per farm. In Indian conditions, where, milk and meat is sourced from numerous small farmers, the traceability may be a difficult option. The cost-effective traceability tools suitable to Indian

farming conditions and acceptable to importing countries will have to be developed and the government of India has taken this emerging need very seriously and efforts are being made to put in place location specific traceability tools. Under organic production systems, traceability of products is almost non-negotiable.

3. **Existence of diseases-** Prevalence of infectious/zoonotic diseases also adversely affects trade in livestock products. More controlled animal health environment is needed especially in case of organic livestock production. Thus, FMD control is number one priority for India. The Diseases Free Zones (DFZs) may be created, where; organic livestock production may be encouraged.
4. **Small farms-** In India, livestock production is mainstay of landless and small scale farmers. However, the landless animal husbandry is not allowed under the organic systems of livestock production, unless they go for land leasing to raise livestock. Whereas, over 80% holdings are < 2 ha. The small farms are not suitable for the development of organic livestock production especially for the exports. The small farms means small volumes coupled with lack of efficient processing infrastructure, results into poor quality. Milk production in India is largely under the domain of small producers producing small volumes, where, dilution, contamination and traceability are some common problems. Therefore, interventions, both technical and policy are critical including developing linkages to support value-addition and marketing of products to ensure making small farm production system highly sustainable. Services and goods including credit and insurance and improved technologies need to be made available to improve efficiency of small farm producers. Contract farming may be a potential solution where many small farmers may contract out their farms to companies, which may produce organic food products on consolidated holdings. The contract farming may be mutually beneficial and organic farming would be easier to pursue under such arrangements for the obvious reasons.
5. **Lack of knowledge-** The awareness about the organic production practices, animal welfare issues and requirements of importing countries is inadequate especially at the level of trainers and farmers. Whereas, the organic production calls for an in-depth understanding of the principles, standards, production practices and requirements of the organic certification agencies. Most of the literature relating to organic farming is available in English through print medium and Internet, which are hardly accessible to small scale farmers.
6. **Lack of training and certification facilities-** Locally available training and certification facilities at an affordable cost to small farmers is yet not much available. Indian small farmers may find it difficult to pay for the

mandatory inspection often done by the foreign certification agencies through their affiliates in India. This may deter many Indian farmers to switch over to organic production especially when there is weak domestic market and current poor prospects for exports in case of livestock products. Training for the trainers and farmers on organic production practices is essential to harness the potential of organic farming. The Krishi Vigyan Kendra (KVKs) may be geared for this purpose. Already some KVKs have initiated work in the area of organic crop production and marketing of organic agro-products including exports (turmeric).

Threats to Development of Organic Animal Husbandry

The prospect of exports is the major motivating factor for the development and growth of organic farming in most of the developing countries including India. These countries may have impressive livestock strength and other favourable factors to their advantage yet the international trade in livestock from the developing world is a risky business as far as organic livestock products are concerned (FAO 2002 and Harris *et al.* 2003). An exporter must have an assured certified supply chain in order to successfully enter international markets. For instance, the need to have a completely organic supply chain could present a problem for export of organic meat from India. Large-scale commercial farms usually undertake most organic livestock production for export; whereas, Indian livestock sector is largely dominated by the small scale producers with little risk bearing ability and resourcelessness. Moreover, the self-sufficiency of organic livestock products in EU may lead to reduced import demand, thus, constraining the growth of organic livestock sector in India. The EU is a net exporter of organic milk, milk products, pork, poultry and eggs. 85% of meat and >90% of the world's milk trade is between developed countries. The developed countries are very restrictive about imports from the developing countries citing mainly the poor sanitary conditions, poor quality and traceability problems prevailing in these countries. Moreover, the developed countries particularly in Europe have huge food surpluses and farmer subsidy problems. Thus, only a handful of developing countries have export potential, including some in South America, Southern Africa (Namibia, Botswana and Zimbabwe) and South East Asia. India will have to make sustained efforts, more than what is being already done in case of other agro products to make its presence felt in organic livestock production. One way could be to develop organic livestock sector initially for domestic consumption so as to move gradually to organic livestock production for export.

Opportunities for India

The threats apart, there are strong reasons for India to focus attention on organic livestock production. Some of the encouraging factors are: (i) Demand for organic livestock products is growing in the USA, EU, Japan, Argentina and Brazil, (ii) Belgium, Luxembourg, Netherlands and UK import significant proportions of organic produce, (iii) The EU is a net importer of organic beef, sheep and goat meat, (iv) Consumers pay a large price premium for organic food in Austria, Belgium, Germany and UK, (v) Some developing countries do trade livestock products to developed countries, (vi) In 2001, 16% of broiler meat and 40% of beef imported to the UK came from developing countries, India may follow the developing countries like Argentina and Brazil that export organic livestock products to EU, (vii) India exported 173 tonnes of certified organic honey in 2001-02, sourced mostly from small scale producers. Organic honey is good entry point along with small ruminants to focus, for organic livestock production in India, (viii) To begin with, non-food livestock products, viz. organic textile/garments including the materials of animal origin like hides, leather, and wool offer hope for organic livestock production in India. There is a large import of textile raw materials and processed textiles into the UK; a significant proportion comes from developing countries. Current global market trends show a rapid increase in international trade in organic textiles. Therefore, organic leather has potential to be a valuable export commodity from India, (ix) Indigenous Technical Knowledge (ITK) available in India may provide effective substitute to veterinary care, (x) The use of agro-chemicals is almost nil in some parts of India, ideal for the development of organic livestock production, (xi) Indian native livestock are less susceptible to diseases and stress, need for allopathic medicines/antibiotics is very less, (xii) Grass based extensive production systems/ forest based animal production prevalent in some parts of India have potential for conversion into organic animal husbandry, (xiii) Literacy is on the rise, media is making the consumers aware and concerned about animal welfare issues and health foods- it may boost domestic consumption of organic foods, (xiv) Growing domestic market for organic products in India may help boost organic market at country, and regional level.

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Organic Livestock Farming: Criticism

Many consider organic farming utopia, fad or impractical idea which may lead to further food shortages particularly in developing countries. Critics of organic agriculture claim that it is based more on ideology than on environmental or economic merit. Organic farming has been denigrated for being less efficient in land use and having lower yields than conventional farming, and even accused of posing potential health risks. According to a commentary in *Nature* by Anthony Trewavas, Fellow of the United Kingdom Royal Society, “Although its supporters assert that organic agriculture is superior to other farming methods, the lack of scientific studies means that this claim cannot be substantiated”. Therefore, the government organizations particularly the agencies under Ministry of Agriculture were having and still many have reservations about this system of production considering the acute food shortages in developing countries. It is mainly export prospects of organic agricultural products which prompted many organizations in developing countries to pay attention to this system of production. The hesitation still persists but the rapid developments at the international level including positive response from organizations like FAO, UNDP, UNEP, UNCTAD, IFAD, The World Bank, apart from the NGOs like IFOAM have almost compelled if not convinced the developing country governments to take measures to promote organic farming for sustainable development. Organic food products are seen as having potential for a limited number of elite consumers, thus, having market niche. More than agricultural ministries in developing countries, the departments dealing with exports, for instance APEDA in India, were more active in promotion of organic farming, since they realized the potential of trade in organic food products.

The critics of organic farming point out that while organic farming may be attractive to consumers who can afford the foods, one of the negative effects of organic farming is that it may not be able to feed everyone within the world. This concern about organic farming is perhaps strongest reason against it by most of the people. But the pro organic lobby has equally strong reasons in support of organic farming saying it is very much possible to attain nearly equal levels of production following organic principles, practices and methods as demonstrated in many experiments around the world. Likewise many apprehensions, skepticisms, criticisms, misconceptions and antagonism to organic farming have been responded to by the proponents of organic farming in their own ways to defend organic farming. Among many others, the IFOAM has brought out a detailed document entitled ‘Criticisms

and Frequent Misconceptions about Organic Agriculture: The Counter-Arguments' (IFOAM 2009).

Some of the misconceptions about organic livestock production have been responded well by the IFOAM, for example:

Animals under organic management are denied proper veterinary treatment, such as vaccinations and antibiotics, which leads to unnecessary and prolonged suffering.

Organic livestock management practices reduce the risk of diseases. Animals under organic management are never denied proper veterinary treatment. If diseases occur, natural treatments are preferred, but veterinary treatments (such as antibiotics and vaccinations) are permitted when absolutely necessary. Animals under organic management are never exposed to unnecessary suffering. According to IFOAM Basic Standards, organic management practices have to promote and maintain the health and well-being of animals through balanced organic nutrition; stress-free living conditions; and breed selection for resistance to diseases, parasites, and infections. In order to maintain animal health, disease prevention is the first recommended strategy. Preventive practices (such as regular exercise, free access to pasture and/or open-air runs, and adequate grazing rotations) stimulate the natural immunity of the animal and increase tolerance to diseases.

Routine or preventive use of chemically synthesized medicines and antibiotics is not allowed in organic farming because routine drug treatments weaken the animal's immune system, can lead to antibiotic resistance, and increase reliance on drugs. When disease occurs, organic farmers are encouraged to use natural and complementary therapies for their animals, including homeopathy, Ayurvedic medicine, and acupuncture. However, if these are not appropriate, then conventional medicines, including antibiotics, can and should be used. The welfare of the animal is paramount. Animal suffering should be avoided at all times. Therefore, if an animal becomes sick or injured despite preventive and alternative measures, that animal shall be treated promptly and adequately, if necessary in isolation and in suitable housing. Veterinary treatment, under the supervision of a veterinarian, is encouraged when it is the only way to avoid unnecessary suffering of the livestock, even if the use of such medication will cause the animal to lose its organic status.

One reason why vaccinations are restricted under organic standards is that many vaccines are genetically engineered. When the vaccine is not genetically engineered, vaccination is allowed under specific limitations: when an endemic disease is known or expected to be a problem in the region of the farm and when the disease cannot be controlled by other management techniques or when a vaccination is legally required. For example, vaccination against diseases like FMD in India is not prohibited.

ORGANIC LIVESTOCK FARMING: CRITICISM

Sometime the concerns raised look quite convincing since organic livestock production differs from conventional systems in many respects. For example:

1. *Animals require a larger housing area (including outdoor access) and straw bedding:* Quite often, it is very difficult to meet out this requirement due to shortage of space especially in small scale production.
2. *Animals are fed organic feed:* Organic feed production is expensive and supply is often very limited. In many areas, it may not be possible to have an assured supply of organic feed and fodder round the year.
3. *There is a restricted use of antibiotics:* Antibiotics are routinely used under many diseases and circumstances. Though there is no absolute no to these in organic systems but restrictions make it a limiting factor.
4. *Preventive medical treatments are not allowed:* Many time prophylactic treatment is essential to safeguard from major problems.
5. *Prolonged waiting times before delivery of products after medical treatments:* Small scale farmers can not withstand loss caused by long withdrawal periods.
6. *Native or slower growing breeds are used:* Local breeds are generally low producers, so low production is considered a serious limitation in organic livestock production.

These measures ultimately lead to a product (milk, eggs, meat) obtained from animals grown under higher welfare conditions, whereby the product contains lesser residues (pesticides, medical drugs) compared with conventional rearing systems. The effects of organic livestock production on the health of the animals are still to be well researched and understood especially in developing country production environment. The principle that organically held animals are in a better condition concerning their health than conventionally held animals has not yet been proven. Well-controlled studies are needed to show the effects of organically held animals on innate and adaptive immune responses and disease susceptibility. The studies/research in organic crop production are now being undertaken in ever increasing number of research institutions and agri universities but on organic animal husbandry there is still a near vacuum.

The conditions in organic livestock production lead to novel challenges concerning social interactions, physical requirements, climatic conditions and infectious burden, which require certain breeds of animals that may differ considerably from the conventionally held animals. More research is needed to identify these breeds whereby selection criteria specific for organic conditions and principles should be used. Important health problems like infestation with parasites have been noted in organic poultry and pig production. Outdoor access is recognized as an important predisposing factor but as yet little is known how to prevent and

treat these infections. Although widely recommended, homeopathy does not have any demonstrated efficacy in managing helminths and the use of herbs is still in its infancy. A multidisciplinary approach is needed to address these questions. Investigations should deal with aspects such as rotation, stocking density, disinfection strategies, genetic predisposition and novel (plant derived or biological) antihelminthics.

Every system has its own limitations and challenges. The green revolution technologies like hybrids, chemical fertilizers, crossbreds could not spread in rainfed areas as also in irrigated areas, it is now showing declining potential like in Punjab. Likewise, there are challenges before organic agriculture production system too. To overcome these challenges, more resources are needed for research and capacity building to develop, demonstrate and disseminate solutions that respond to concerns about the cost of conversion to organic production, certification costs, and tariff and non-tariff barriers to lucrative international markets. There is also a need to raise awareness among policymakers and in the private sector about the economic, environmental and social development opportunities offered by organic agriculture and how they can be exploited with the support of economic and policy instruments. Rather than dismissing organic agriculture as an impractical idea, we must learn and reap multiple benefits it offers. The Punjab was a pioneer and leading state in adoption of green revolution technologies and it again leads in organic farming as it exports significant quantities of organic Basmati rice to Europe and America-this is called orienting to changing needs and realities of time!!! Those who don't change with the changing times are likely to see their doom, no one to blame but own self!!

EPILOGUE

To recognize and highlight the role of animals in organic production, the IFOAM organized an International Conference on Animals in organic production at Minnesota, USA in August 2006 -a first ever conference of its kind. As an indication to the development in the field of organic livestock production at international level, the declaration of the First IFOAM International Conference on Animals in Organic Production is being reproduced below in verbatim. The first author was not only the member of programme committee of this first ever conference on the topic, but also present in the conference, thus, a signatory to the declaration.

St. Paul Declaration

On the occasion of the first IFOAM International Conference on Animals in Organic Production, held at the University of Minnesota, St. Paul, Minnesota, USA, from

ORGANIC LIVESTOCK FARMING: CRITICISM

August 23 to 25, 2006, over 250 participants from over 24 countries unanimously approved the following declaration in support of organic animal production.

“We, the participants of the first IFOAM International Conference on Animals in Organic Production, recognize that animals are sentient beings. Rearing animals for production and domestic purposes is an evolving relationship that has spanned millennia and is based on ecological principles of mutualism and interdependency, bound to culture and local circumstances. We are committed to the Principles of Organic Agriculture that ensure the inclusion of animal welfare and animal health management as integral components of organic food and fiber production systems. The basis for organic animal production is the development of a harmonious relationship among soil, plants, animals and humans. Organic animals should be provided with the conditions and opportunities that accord with their physiology and natural behavior.

We believe organic livestock production methods enhance the sustainability of agricultural production systems. We are convinced that organic livestock production methods produce healthy animals and quality livestock products that enhance human health.

The findings of this conference are that new methodologies to conduct scientific research to expand the organic management of livestock animals are under active development in many countries. Organic Agriculture, based on traditional, experiential and scientific knowledge, provides a learning path for constant improvement and innovation for the benefit of people, animals and the environment.

We are convinced of the huge potential for continued growth and development of the organic livestock sector. Therefore:

- *We are committed to expanding research and extension on organic animal production and management systems. We call for financial and institutional support for this endeavor.*
- *We acknowledge the role of organic standards in achieving tangible outcomes for animal health and welfare. We call for evaluation and further development of organic standards to support the progress of this sector.*
- *We believe that this sector offers ethical investment opportunities and call on the business and investment community to participate in the sustained economic development of the organic livestock sector..*

Approved by Acclamation

August 25, 2006

University of Minnesota, St. Paul, Minnesota, USA

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Appendix



List of Inspection and Certification Agencies of India under the National Programme for Organic Production (NPOP)

Sr. No.	Name of the Certification Agency	Contact Person & Address	Accreditation No.	Validity of Current Accreditation	Scope of Accreditation	Certification Mark
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1	Bureau Veritas Certification India Pvt Ltd (Formerly Known as BVQI (India) Pvt Ltd)	Contact Person: Mr R K Sharma Director Address: Marwah Centre, 6th Floor Opp. Ansa Industrial Estate Krishanlal Marwah Marg Off Saki-Vihar Road Andheri (East), Mumbai - 400 072 (Maharashtra) Tel. No: 022-66956300, 56956311 Fax No: 022-66956302/10 Email: scsinfo@in.bureauveritas.com	NPOP/NAB/001	14-09-2009	NPOP	
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USDA
NOP

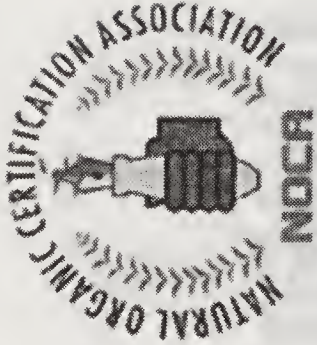

Sr. No.	Name of the Certification Agency	Contact Person & Address	Accreditation No.	Validity of Current Accreditation	Scope of Accreditation	Certification Mark
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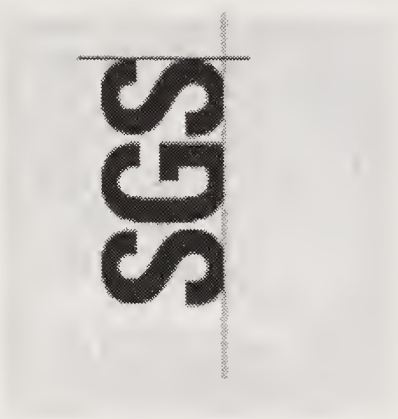

2	ECOCERT India Pvt Ltd	Contact Person: Dr Selvam Daniel Country Representative Address: Sector-3, S-6/3 & 4, Gut No. 102, Hindustan Awas Ltd Walmi-Waluj Road Nakshatrawadi, Aurangabad, 431002 (Maharashtra) Tel No: 0240-2377120, 2376949 Fax No: 0240-2376866 Email: ecocert@sanchamnet.in	NPOP/NAB/ 002	22-08-2008 (Extended till next NAB meeting)	NPOP USDA NOP	
3	IMO Organic Pvt Ltd	Contact Person: Mr Umesh Chandrasekhar Director Address: No. 3627, 1 st Floor, 7 th Cross, 13 th 'G' Main, HAL, 2 nd Stage, Bangalore-560 008 Tel No: +91-80-25285883 25215780 Fax: +91-80-25272185 Email: imoind@vsnl.com Web: www.imo.ch	NPOP/NAB/ 003	27-09-2010	NPOP USDA NOP	

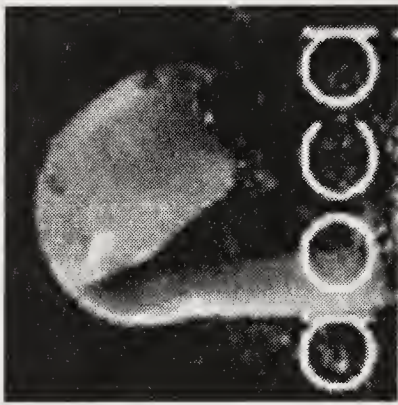
Sr. No.	Name of the Certification Agency	Contact Person & Address	Accreditation No.	Validity of Current Accreditation	Scope of Accreditation	Certification Mark
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4	Indian Organic Certification Agency (INDOCERT)	Contact Person: Mr Mathew Sebastian Director Address: Thottumugham PO Aluva 683 105 Cochin (Kerala) Telefax: 0484-2630908-09 2620943 Email: info@indocert.org	NPOP/NAB/ 004	24-10-2008 (Extended till next NAB meeting)	NPOP USDA NOP	
5	Lacon Quality Certification Pvt Ltd	Contact Person: Mr Bobby Issac Director Address: Chenathra, Theepany, Thiruvalla 689 101 (Kerala) Tel. No: 0469-2606447 Fax: 0469-2631902 Email: info@laconindia.com Web: www.laconindia.com	NPOP/NAB/ 006	31-09-2008 (Extended till next NAB meeting)	NPOP USDA NOP	

Sr. No.	Name of the Certification Agency	Contact Person & Address	Accreditation No.	Validity of Current Accreditation	Scope of Accreditation	Certification Mark
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6	Netural Organic Certification Agency (NOCA)	Contact Person: Mr Bobby Issac Chief Executive Officer Address: Row House Banglow No-2 E-10 Bldg. Sun Empire, Survey No. 7, 9 (Part) Vadgaon - Budruk, Sinhgad Road, Pune 411 051 Mobile No: 9822006586/ 9822148609 Tel. No: +91-20-65218063 Fax No: +91-20-25457869 Email: nocaindia@gmail.com Web: www.nocaindia.com	NPOP/NAB/ 007	23-05-2009	NPOP USDA NOP	
7	OneCert Asia Agri Certification Pvt Ltd	Contact Person: Mr Sandeep Bhargava Chief Executive Director Address: Plot No. 8, Pratap Nagar Colony (Near Glass Factory and Gopalpura by Pass), Tonk Road, Jaipur 302 017 (Rajasthan) Telefax: 0141-2701882 Email: info@onecertasia.in	NPOP/NAB/ 008	26-10-2009	NPOP USDA NOP	

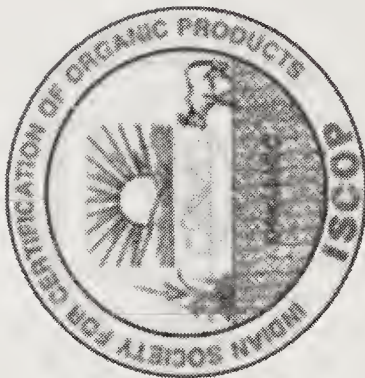
Sr. No.	Name of the Certification Agency	Contact Person & Address	Accreditation No.	Validity of Current Accreditation	Scope of Accreditation	Certification Mark
8	SGS India Pvt Ltd	Contact Person: Dr Manish Pande Head - Food Service Address: 250 Udyog Vihar, Phase-IV Gurgaon - 122 015 (Haryana) Tel. No: +91-124-2399990 Mobile No: +91-9871794640 Fax No: +91-124-2399764 Email: pande@sgs.com	NPOP/NAB/ 009	01-05-2011	NPOP USDA NOP	
9	Control Union Certifications (Formerly known as Skal International (India))	Contact Person: Mr Dirk Teichert Managing Director Address: "Summer Ville", 8th Floor 33rd-14th Road Junction Off Linking Road, Khar (West) Mumbai 400 052 (Maharashtra) Tel. No: 022-67255396/97/98/99 Fax No: 022-67255394/95 Email: cuc@controlunion.in cucindia@controlunion.com controlunion@vsnl.com	NPOP/NAB/ 010	28-05-2008 (Extended till next NAB meeting)	NPOP USDA NOP	

Sr. No.	Name of the Certification Agency	Contact Person & Address	Accreditation No.	Validity of Current Accreditation	Scope of Accreditation	Certification Mark
10	Uttarakhand State Organic Certification Agency (USOCA)	Contact Person: Dr B S Bisht Director Address: 12/II Vasant Vihar Dehradun 248 006 (Uttarakhand) Tel. No: 0135-2760861 Fax No: 0135-2760734 Email: uss_opca@rediffmail.com ua_usoca@yahoo.co.in	NPOP/NAB/ 011	13-11-2009	NPOP USDA NOP	
11	APOF Organic Certification Agency (AOCA)	Contact Person: Mr K Dorairaj Chief Operating Officer Address: 141/7, 1st Floor, Munireddypalya, J C Nagar, Opp. Fun World Bangalore 560 006 Tel. No: 080-23537888 080-65369888 Email: aocabangalore@yahoo.co.in Web: www.aoca.in	NPOP/NAB/ 012	09-01-2010	NPOP	



Sr. No.	Name of the Certification Agency	Contact Person & Address	Accreditation No.	Validity of Current Accreditation	Scope of Accreditation	Certification Mark
12	Rajasthan Organic Certification Agency (ROCA)	Contact Person: Mr Yashpal Mahawat Director Address: 3rd Floor, Pant Krishi Bhawan, Janpath, Jaipur 302 005 Rajasthan Tel. No: 0141-2227104 Tele Fax: 0141-2227456 Email: rocajpr.cb@gmail.com	NPOP/NAB/ 013	09-10-2010	NPOP	
13	Vedic Organic Certification Agency	Contact Person: Dr (Mrs.) M. Usha Managing Director Address: Plot No. 55, Ushodaya Enclave, Mythinagar, Miyanagar, Hyderabad 500 050 Mobile No: 09290450666 Tel. No: 040-65276784 Fax No: 040-23045338 Email: voca_org@yahoo.com usha_preetham@yahoo.co.in	NPOP/NAB/ 014	30-09-2011	NPOP	

Sr. No.	Name of the Certification Agency	Contact Person & Address	Accreditation No.	Validity of Current Accreditation	Scope of Accreditation	Certification Mark
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14	ISCOP (Indian Society for Certification of Organic Products)	Contact Person: Prof Dr K K Krishnamurthi President Address: Rasi Building 162/163, Ponnaiyarajapuram Coimbatore 641 001 Tamil Nadu Mobile No: 09443243119 Tel. No: 0422-2544199; 0422-6586060 Email: profdrkkk@yahoo.com iscopcbe@yahoo.co.in Web: www.iscoporaganiccertainment.org	NPOP/NAB/ 015	30-09-2011	NPOP	
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Sr. No.	Name of the Certification Agency	Contact Person & Address	Accreditation No.	Validity of Current Accreditation	Scope of Accreditation	Certification Mark
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15	Food Cert India Pvt Ltd	Contact Person: Mr Srihari Kotela Director Address: Quality House, H.No. 8-2-601/P/6 Road No. 10, Banjara Hills, Panchavati Colony Hyderabad 500 034 Tel. No: +91-40-23301618, +91-40-23301554/23301582 Fax Mo: +91-40-23301583 Email: foodcert@foodcert.in	NPOP/NAB/ 016	30-09-2011	NPOP	
16	Aditi Organic Certifications Pvt Ltd	Contact Person: Narayana Upadhyaya Director Address: No. 531/A, Priya Chambers Dr Rajkumar Road, Rajajinagar 1st Block, Bangalore 560 010 Tel. No: +91-80-32537879 Fax No: +91-80-23373083 Mobile No: +91-9845064286 Email: aditiorganic@gmail.com Web: www.aditicert.net	NPOP/NAB/ 017	30-09-2011	NPOP	

List of Approved Ingredients of Non-agricultural Origin and Processing Aids used in Food Processing

Feed Additives and Carriers

Intel numbering system	Product	Product group	Limitation/Note
INS 407	Carrageenan	GA	Milk products
INS 410	Locust bean gum	GA	Milk and meat products
INS 414	Arabic gum	MI/F/CO	Milk, fat and confectionary products
INS 440	Pectin	GA	Unmodified (Milk products)
INS 500	Sodium carbonates	CO/CB	Milk products neutralizing substances
INS 509	Calcium chloride	MI/F/FV/SO	Milk products/Meat products/Fat products/ Fruits and vegetables

Flavouring Agents

- Volatile (essential) oils produced by means of solvents such as oil, water, ethanol, carbon dioxide and mechanical and physical processes.
- Natural smoke flavor.
- Use of natural flavouring preparations should be approved on the national procedure to evaluate additives and processing aids based on NSOP guidelines.

Preparations of micro-organisms: Preparations of micro-organisms accepted for use in food processing. Genetically modified organisms are excluded.

- Bakers yeast produced without bleaches and organic solvents.

Animal Data Recording

The Operator shall maintain the health, breeding and production records of animals maintained in the farm. Each animal will be identified with a unique identification number with ear tags as specified by International Committee on Animal Records (ICAR) and adopted by India.

Animal Identification: In case of cattle/buffalo, sheep and goat each animal will be applied identification device as prescribed by ICAR and could be two-way plastic ear tag (laser-printed numeric and in bar code) or three-way (additional RFID micro-chip) identification number of the animal. In case of birds, flock may be identified. The identification devices of the out-going animals should not be recycled and used on other animals.

Animal Data Recording: The data of the animal should be recorded preferably in digital format so that data retrieval is convenient. The animal data should be accessible to the veterinarian and the Inspection Authority. Following data for each animal should be recorded in case of ruminants:

- Parent details: Identification numbers and details of dam and sire.
- The Competent Authority may relax during the initial period, so specified, the condition of details of sire in case of ruminants and pigs.
- Source: Whether in farm or purchased.
- Purchase details: Date of purchase, date of introduction in the farm, details of the earlier owner.
- Animal Details: Date of birth, parity number.
- Breeding Details: Details of dates of services, sire used, drying off, calving.
- Production Details: Weight gain, milk produced (Minimum one record per month of lactation) in case of cow and buffalo.
- Sale Details: In case of sheep and goat weight at the time of sale, reasons for sale, the purchaser details.
- Health Details: All sickness treatment, diagnostic tests results, vaccination, deworming, surgeries, etc.

Minimum surface area indoors and outdoors and other characteristics of housing in different species and types of production

1. Bovines, Equidae, Ovine, Caprine and Pig

Livestock	Indoor area		Outdoor area	
	Live weight minimum (Kg)	(net area available to animals) M ² /Head	(exercise area, excluding pasturage) M ² /Head	
Breeding and fattening bovine and equidae	Up to 100	1.5	1.1	
	Up to 200	2.5	1.9	
	Up to 350	4.0	3	
	Over 350	5 with a minimum of 1 m ² /100 kg	3.7 with a minimum of 0.75 m ² /100 kg	
Dairy cows Bulls for breeding Sheep and goats		6	4.5	
		10	30	
		1.5 sheep/goat	2.5	
		0.35 lamb/kid	0.5	
Farrowing Pigs with piglets upto 40 days		7.5 sow	2.5	
Fattening pigs	Up to 50	0.8	0.6	
	Up to 85	1.1	0.8	
	Up to 110	1.3	1	

Piglets	Over 40 days and up to 30 kg	0.6	0.4
Brood pigs		2.5 female 6 male (If pens are used for natural service: 10m ² /boar)	1.9 8.0
2. Poultry			
Poultry		Indoor area (net area available to animals)	Outdoor area (exercise area, excluding pasturage)
	No. animals/m ²	Cm perch/animal	nest
Laying hens	6	18	7 laying hens per nest
			or in case of common nest 120 cm ² /bird
			hac/year is not exceeded
Fattening poultry (in fixed housing)	10 with a maximum of 21 Kgliveweight/m ²	20 (for guinea fowl only)	4 broilers and guinea fowl 4.5 ducks 10 turkey In all the species mentioned above the limit of 170 kg of N/hac/year is not exceeded

Maximum No. of Animals per Hectare

Species/Class	Maximum no. per ha.
Equines over six months old	2
Calves	5
Other bovine animals less than one year old	5
Male bovine animals from one to less than two years old	4
Female bovine animals from one to less than two years old	4
Male bovine animals two years old or over	2
Dairy Cows	2
Female breeding rabbits	100
Sheep	14
Goats	14
Piglets	74
Breeding Pigs	7
Pigs for fattening	14
Chicken	580
Laying hens	230

Day Length Requirements for Poultry

Broilers: 23 hours light and 1 hour darkness throughout the rearing period

Layers:

Age

0 – 8 weeks	23 hours light and one hour darkness
0 – 19 weeks	Gradually decrease the light hours from 23 to 12 hours or natural day length
20- 60 weeks	Gradually increase the light hours from 12 to 16 hours
60 – 72 weeks	Increase light to 18 hours

Other birds:

Increase the light hours when the birds start laying eggs

Permitted List of Feed Materials, Feed Additives and Processing Aids for Animal Nutrition

1. Feed materials from plant origin

1.1. Cereals, grains, their products and by-products. The following substances are permitted:

- ◆ Oats as grains, flakes, middlings, hulls and bran;
- ◆ Wheat as grains, wheat as germ, middling, bran [IS 2239:1971], gluten feed, gluten and germ; [IS 2239:1971]
- ◆ Barley as grains, protein and middlings;
- ◆ Maize as grains; bran [IS 2153:1985] middling; germ expeller and gluten [IS 2152:1972];
- ◆ Sorghum as grains;
- ◆ Rice germ expeller and bran;
- ◆ Millet as grains;
- ◆ Rye as grains and middlings;
- ◆ Triticale as grains, bran, middlings, brewers' grains.
- ◆ Other cereals and grains

1.2. Oil seeds, oil fruits, their products and by-products. The following substances are permitted:

- ◆ Rape seed and mustard [IS 1932:1986] as expeller and hulls;
- ◆ Soyabean as bean, toasted, expeller and hulls;
- ◆ Sunflower seed [IS 14702:1999] as seed and expeller;
- ◆ Cotton as seed and seed expeller;
- ◆ Linseed [IS 1935:1982] as seed and expeller;
- ◆ Sesame seed [IS 1934:1982] as expeller;
- ◆ Groundnut seed [IS 3441:1982] as expeller;
- ◆ Palm kernels as expeller;
- ◆ Safflower decorticated cake [IS 6242:1985]
- ◆ Toria cake
- ◆ Taramira cake
- ◆ Pumpkin seed as expeller;
- ◆ Other oilseeds
- ◆ Vegetable oils (from physical extraction).

1.3. Legume seeds, their product and by-products. The following substances are permitted:

- ◆ Bengal gram as seeds, middlings and hulls
- ◆ Blackgram as seeds, middlings and hulls
- ◆ Pigeonpea as middlings and hulls
- ◆ Greengram as middlings and hulls
- ◆ Horse beans as seeds middlings and bran
- ◆ Lentil as middlings and hulls
- ◆ Chickpeas as seeds, middlings and bran;
- ◆ Ervil as seeds, middlings and bran as seeds submitted to heat treatment, middlings and bran,
- ◆ Peas as seeds, middlings, and bran;
- ◆ Broad beans as seeds middlings and bran; and
- ◆ Lupin as seeds, middlings and bran.
- ◆ Other legumes

1.4. Tuber, roots, their products and by-products. The following substances are included in this category:

- ◆ Sugar beet pulp, potato
- ◆ Sweet potato as tuber,
- ◆ Potato pulp (by-product of the extraction of potato starch), potato starch, potato protein and manioc
- ◆ Carrot
- ◆ Turnip
- ◆ Other tubers

1.5. Other seeds and fruits, their products and by-products. The following substances are permitted:

- ◆ Fruits and fruit pulps of apple, citrus fruits, pears, peaches, grapes, figs, pineapple, quinces, pumpkins;
- ◆ Chestnuts, walnut expeller, hazelnut expeller; cocoa husks and expeller; acorns.
- ◆ Mango seeds [IS 12829:1989], tamarind seeds meal.

1.6. Forages and roughages. The following substances are permitted:

- ◆ Cultivated fodder crops. Only the following fodder crops are included in this category:

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- Sorghum (*Sorghum vulgare*)
- Maize (*Zea mays*)
- Bajra (*Pennisetum glaucum*)
- Teosinte (*Euchlaena maxicana*)
- Cowpea (*Vigna unguiculata*)
- Guar (*Cyamopsis tetragonoloba*)
- Oats (*Avena sativa*)
- Berseem (*Trifolium alexadrinum*)
- Lucerne (*Medicago sativa*)
- Senji (*Melilotus parviflora*)
- Hybrid napier
- Para grass (*Brachiaria mutica*)
- Rhodes grass (*Chloris gayana*)
- Guinea grass (*Panicum maximum*)
- Sudan grass (*Sorghum sudanenes*)
- Mustard (*Brassica* spp)
- ◆ Clover, clover meal, grass (obtained from forage plants), grass meal,
- ◆ Hay, silage and straw of cereal crops and root vegetables for foraging.
- ◆ Pasture grass and legumes: Following are included in this category:
 - Anjan (*Cenchrus ciliaris*)
 - Marvel (*Dichanthium annulatum*)
 - Dinanath (*Pennisetum pedicellatum*)
 - Kazungla (*Setaria sphacelata*)
 - Sain (*Sehima nervosum*)
 - Siratro (*Macroptilum atropurpureum*)
 - Stylo (*Stylosanthes humilis*)

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- Bankulthi (*Atylosia scarabaeoides*)
- Field bean (*Dolichos lablab*)
- Butterfly pea (*Clitoria termatea*)
- ◆ Leaves of common Indian trees. Following trees are included in this category whose leaves can be fed to animals
 - *Acacia arabica* (Babul)
 - *Acacia senegal* (Kumat)
 - *Adina cordifolia* (Haldu)
 - *Ailanthus excelsa* (Ardu)
 - *Amaranthus spinosus* (Goja),
 - *Albizia lebbek* (Siras)
 - *Azadirachta indica* (Neem)
 - *Banahinia variegata* (Kachnar)
 - *Cassia auriculata* (Tarwad)
 - *Dalbergia sissoo* (Sissoo)
 - *Ficus benghalensis* (Bargad)
 - *Ficus religiosa* (Peepal)
 - *Ficus glomerata* (Gular)
 - *Hardwickia binata* (Anjan)
 - *Leucaena leucocephala* (Subabul)
 - *Morus alba* (Tut)
 - *Morus indica* (Mulberry)
 - *Prosopis cineraria* (Khejri)

1.7. Other plants, their products and by-products. The following substances are included in this category:

- ◆ Molasses
- ◆ Seaweed meal (obtained by drying and crushing seaweed and washed to reduce iodine content),
- ◆ Powders and extracts of plants,

- ◆ Plant protein extracts (solely provided to young animals),
- ◆ Spices and herbs.

2. Feed materials from animal origin

2.1. Milk and milk products. The following substances are included in the category:

- ◆ raw milk .
- ◆ milk powder, skimmed milk, skimmed-milk powder,
- ◆ buttermilk, buttermilk powder,
- ◆ whey, whey powder, whey powder low in sugar, whey protein powder (extracted by physical treatment),
- ◆ casein powder, lactose powder, curd and sour milk.

2.2. Fish, other marine animals, their products and by-products. Only the following substances are included in the category:

- ◆ fish, fish oil and cod-liver oil not refined;
- ◆ fish molluscan or crustacean autolysates, hydrolysate and proteolysates obtained by an enzyme action, whether or not in soluble form, solely provided to young animals.
- ◆ Fish meal [IS 4307:1983]

2.3. Eggs and egg products for use as poultry feed, preferably from the same holding.

3. Feed materials from mineral origin [IS 1664:2002]

The following substances are included in this category:

◆ Sodium:

- unrefined sea salt
- coarse rock salt
- sodium sulphate
- sodium carbonate
- sodium bicarbonate
- sodium chloride [IS 920:1972]

◆ Potassium:

- potassium chloride;

◆ **Calcium:**

- lithotamnion and maerl
- shells of aquatic animals (including cuttlefish bones)
- calcium carbonate
- calcium lactate
- calcium gluconate;

◆ **Phosphorus:**

- defluorinated dicalcium phosphate [IS 5470:2002]
- defluorinated monocalcium phosphate
- monosodium phosphate
- calcium-magnesium phosphate
- calcium-sodium phosphate;

◆ **Magnesium:**

- magnesium oxide (anhydrous magnesia)
- magnesium sulphate
- magnesium chloride
- magnesium carbonate
- magnesium phosphate;

◆ **Sulphur:**

- sodium sulphate

4. Feed additives, certain substances used in animal nutrition and processing aids used in feeding stuffs

4.1. Feed additives

4.1.1. Trace elements the following substances are included in this category:

◆ **Iron**

- ferrous (II) carbonate
- ferrous (II) sulphate monohydrate and/or heptahydrate
- ferric (III) oxide;

◆ **Iodine:**

- calcium iodate, anhydrous
- calcium iodate, hexahydrate
- sodium iodide;

◆ **Cobalt:**

- cobaltous (II) sulphate monohydrate and/or heptahydrate
- basic cobaltous (II) carbonate, monohydrate;

◆ **Copper:**

- copper (II) oxide
- basic copper (II) carbonate, monohydrate
- copper (II) sulphate, pentahydrate;

◆ **Manganese:**

- manganous (II) carbonate
- manganous oxide and manganic oxide
- manganous (II) sulfate, mono- and/or tetrahydrate;

◆ **Zinc:**

- zinc carbonate
- zinc oxide
- zinc sulphate mono- and/or heptahydrate;

◆ **Molybdenum:**

- ammonium molybdate,
- sodium molybdate;

◆ **Selenium:**

- sodium selenate

4.1.2. Vitamins, pro-vitamins and chemically well defined substances having a similar effect. The following substances are included in this category:

- ◆ preferably derived from raw materials occurring naturally in feeding stuffs, or

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- ◆ synthetic vitamins identical to natural vitamins only for monogastric animals

By derogation from the first subparagraph, and during a transitional period as determined by the competent authority, the use of synthetic vitamins of types A, D and E for ruminants may be authorized in so far as the following conditions are met:

- ◆ the synthetic vitamins are identical to the natural vitamins, and
- ◆ the authorization issued by the Competent Authority is founded on precise criteria.

Producers may benefit from this authorization only if they have demonstrated to the satisfaction of the inspection body or authority that the health and welfare of their animals cannot be guaranteed without the use of these synthetic vitamins.

4.1.3. Microorganisms: following microorganisms are included in this category:

- ◆ microorganisms such as lactobacillus, yeast, etc., that are not genetically modified.

4.1.4. Preservatives: the following substances are included in this category:

- ◆ Sorbic acid
- ◆ Formic acid
- ◆ Acetic acid
- ◆ Lactic acid
- ◆ Propionic acid
- ◆ Citric acid

The use of lactic, formic, propionic and acetic acid in the production of silage shall be only permitted when weather conditions do not allow for adequate fermentation.

4.1.5. Binders, anti-caking agents and coagulants. The following substances are included in this category:

- ◆ Calcium stearate of natural origin
- ◆ Colloidal silica
- ◆ Kieselgur
- ◆ Bentonite

- ◆ Kaolinitic clays
- ◆ Natural mixtures of stearites and chlorite
- ◆ Venniculite
- ◆ Sepiolite
- ◆ Perlite

4.1.6. Antioxidant substances. The following substances are included in this category:

- ◆ Tocopherol – rich extracts of natural origin

4.1.7. Silage additives. The following substances are included in this category:

- ◆ enzymes, yeasts and microorganisms that are not genetically modified.

4.2. Certain products used in animal nutrition

The following products are included in this category:

- ◆ brewer's yeasts

4.3. Processing aids used in feeding stuffs

4.3.1. Processing aids for silage. The following substances are included in this category:

- ◆ sea salt, coarse rock salt, whey, sugar, sugar beet pulp, cereal flour and molasses,

4.4. Biologicals and immunologicals in feed:

- ◆ Colostrum powder/whole colostrum provided that it is preferably derived from animals that are reared under organic farming.
- ◆ Ayurvedic and plant-derived products that are claimed to have immunopotentiating properties.

Enzymes and their sources permitted for use in animal / poultry feed

Name of the enzyme	Source
alpha-Amylase	<i>Aspergillus niger</i> <i>Aspergillus oryzae</i> <i>Bacillus amyloliquefaciens</i> <i>Bacillus lentus</i> <i>Bacillus licheniformis</i> <i>Bacillus stearothermophilus</i> <i>Bacillus subtilis</i> Barley malt <i>Rhizopus niveus</i> <i>Rhizopus oryzae</i>
Maltogenic alpha-Amylase	<i>Bacillus subtilis</i> containing a
beta-Amylase	Barley malt
Cellulase	<i>Aspergillus niger</i> <i>Humicola insolens</i> <i>Trichoderma longibrachiatum</i> (formerly <i>reesei</i>)
alpha-Galactosidase	<i>Aspergillus niger</i> <i>Mortierella vinaceae</i> <i>raffinoseutilizer</i> <i>Saccharomyces</i> sp.
beta-Glucanase	<i>Aspergillus niger</i> <i>Bacillus lentus</i> <i>Bacillus subtilis</i> <i>Humicola insolens</i> <i>Trichoderma longibrachiatum</i> (formerly <i>reesei</i>)
β-Glucosidase	<i>Aspergillus niger</i>
Glucoamylase	<i>Aspergillus niger</i>
also known as amlyo-glucosidase	<i>Aspergillus oryzae</i> <i>Rhizopus niveus</i> <i>Rhizopus oryzae</i>
Hemicellulase	<i>Aspergillus aculeatus</i> <i>Aspergillus niger</i> <i>Bacillus lentus</i>

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	<i>Bacillus subtilis</i> <i>Humicola insolens</i> <i>Trichoderma longibrachiatum</i> (formerly <i>reesei</i>)
Invertase	<i>Aspergillus niger</i> <i>Saccharomyces</i> sp.
Lactase	<i>Aspergillus niger</i> <i>Aspergillus oryzae</i> <i>Candida pseudotropicalis</i> <i>Kluyveromyces marxianis</i> var. <i>lactis</i> (formerly <i>Saccharomyces</i> sp.)
beta-Mannanase	<i>Aspergillus niger</i> <i>Bacillus lentus</i> <i>Trichoderma longibrachiatum</i>
Pectinase	<i>Aspergillus aculeatus</i> <i>Aspergillus niger</i> <i>Rhizopus oryzae</i>
Pullulanase	<i>Bacillus acidopullulyticus</i> <i>Bacillus licheniformis</i> containing <i>Bacillus</i> <i>deramificans</i> gene for pullulanase
Xylanase	<i>Aspergillus niger</i> <i>Bacillus lentus</i> <i>Bacillus subtilis</i> <i>Humicola insolens</i> <i>Trichoderma longibrachiatum</i> (formerly <i>reesei</i>)
Lipase	<i>Aspergillus niger</i> <i>Aspergillus oryzae</i> <i>Candida rugosa</i> (formerly <i>cylindracea</i>) <i>Rhizomucor</i> (<i>Mucor</i> -) <i>miehei</i> <i>Rhizopus oryzae</i>
Bromelain	Pineapples - stem, fruit
Ficin	Figs
Papain	Papaya
Protease (general)	<i>Aspergillus niger</i> <i>Aspergillus oryzae</i>

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	<i>Bacillus amyloliquefaciens</i>
	<i>Bacillus licheniformis</i>
	<i>Bacillus subtilis</i>
Catalase	<i>Aspergillus niger</i>
	<i>Micrococcus lysodeikticus</i>
Phytase	<i>Aspergillus niger</i>
	<i>Aspergillus oryzae</i>

Antibiotic/antibacterial withdrawal period

Intramammary preparations	Discard time for milk
Benzathine cloxacillin	72 hr (of milk discard)
Cloxacillin sodium	48 hr (of milk discard)
Hetacillin potassium	72 hr (of milk discard)
Prcaine penicillin G (Peanut oil)	84 hr (of milk discard)

Withdrawal periods (Sheep and goats)

Drug	Pre-slaughter withdrawal time (days)
Chlortetracycline (Oral)	2
Procaine penicillin-G	9
Procaine penicillin-G, dihydrostreptomycin sulphate	30
dihydrostreptomycin sulphate	30
Erythromycin	3
Sulphamethazine	10
Sulphamethazine (Oral)	10
Sulphaquinoxaline(Oral)	10
Sulpfisoxazole(Oral)	10
Tetracycline(Oral)	
Thiabendazole (Oral)	30

Withdrawal periods (Swine)

Drug	Pre-slaughter withdrawal time (days)
Chlortetracycline (Oral)	2
Procaine penicillin-G	30
Procaine penicillin-G, dihydrostreptomycin sulphate	30
Dihydrostreptomycin sulphate	30
Erythromycin	7
Ampicillin trihydrate	15
lincomycin hydrpchloride	2
Oxytetracycline HCl	26
Tylosin	4
Amoxycillin trihydrate (oral)	15
Ampicillin trihydrate (oral)	15
Chlortetracycline, Sulphathiazole, Procaine penicillin (oral)	7
Chlortetracycline, sulphamethazine, penicillin (oral)	15
Chlortetracycline HCl (oral)	5
Dihydrostreptomycin (oral)	30
Erythromycin (oral)	7
Furazolidine (oral)	5
Hygromycin B (oral)	2
Lincomycin (oral)	6
Nystatin (oral)	
Oxytetracycline (oral)	26
Penicillin 50 g /900 kg ffed (oral)	0
Spectinomycin dihydrochloride pentahydrate (oral)	21
Streptomycin, sulphathizole, phthalylsulphathiazole (oral)	10
Sulphachloropyridazine sodium (oral)	4
Sulphaethoxypyridazine (oral)	10
Sulphamethazine (oral)	15
Sulphaquinoxaline (oral)	10

Withdrawal periods (Poultry)

Drug	Pre-slaughter withdrawal time (days)
Bacitracin	0
Carbomycin	1
Chlortetracycline	1
Erythromycin	2
Gentamycin sulphate (inj)	35
Lincomycin	5
Monensin sodium	5
Nitrofurazone	5
Novobiocin	4
Oleandamycin	
Oxytetracycline (50-200 g/900 kg feed)	0
Penicillin (2.4-125 g/900 kg)	0
Spectinomycin	5
Sulphadimethoxine	5
Sulphaquinoxaline	10
Tylosin phosphate	5

Data collected from Jones Veterinary Pharmacology and Therapeutics Vth edition.
Toxicity of drug and chemical residues, pp 1065

Products Authorized for Cleaning and Disinfection of Livestock Buildings and Installations

- Potassium and sodium soap
- Water and steam
- Milk of lime
- Lime
- Quicklime
- Sodium hypochlorite (e.g. as liquid bleach)
- Caustic potash
- Hydrogen peroxide
- Natural essences of plants
- Citric, peracetic acid, formic, lactic, oxalic and acetic acid
- Alcohol
- Nitric acid (dairy equipment)
- Phosphoric acid (dairy equipment)
- Formaldehyde
- Sodium carbonate

List of diseases for herd/flock diagnosis

The operator in consultation with the veterinarian should draw a program of health management of the animals and carry out testing of the herd for following diseases:

Cattle including buffaloes:

- Brucellosis
- Leptospirosis
- Mastitis
- Tuberculosis
- Para-tuberculosis

Sheep and goat:

- Brucellosis
- Leptospirosis
- Tuberculosis
- Para-tuberculosis

Pigs

- Swine fever
- Brucellosis

Poultry

- *Mycoplasma gallinarum*
- Fowl typhoid

1. Animal requested for certification

Producer Year _____

Name _____

Code: O – Organic; T – In transition or conversion to organic status (breeding stock only); C – Conventional

Livestock type	Number: Female			Number: Males			Number: Castrated Males	Number: Young stock		
	O	T	C	O	T	C		O	T	C
							O	T	C	

Cow

Pigs

Buffalo

Sheep

Coats

Chickens

2. Breeding Records

Producer Name _____

Bred organic animal ID	Bull ID or sire	Projected freshening date	Actual freshening date	Name and date of last use of parasiticide	Calf ID	Disposition of calf: sell as non-organic, sell as organic, or replacement stock
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3. Source of Purchased Animals

Producer Name _____

Type livestock purchased	ID# or name	Date of purchase	Purchase source	Certified organic by which agency	If not certified organic, date started feeding 100% organic feed	Projected or or real freshening date
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4. Planned or Actual Organic Feed Ration Record

Producer _____ Year _____

Name _____

Livestock

Species _____

[illegible]

5. Purchased Organic Feed Record

Producer Name _____

[illegible]

6. New Organic Dairy Herd Feed Record

Producer Name _____

Feed pasture, corn, hay, silage,	% of daily ration	Certified organic (CO), certifiable (C), transitional (T), non- organic (NO)	Source of feed (field numbers if grown by you or from whom you purchased)	What date did you start feeding this feed?	What date did you discontinue feeding this feed (if applicable)

7. Feed Supplements and Additives Inventory

Producer

Year _____

Name _____

Feed supple- ment/ additive	Source or brand	Date of first use	Synthetic ingredients yes (Y), no (N) or don't know (?)	Genetically engineered ingredients yes (Y), no (N) or don't know (?)	Date approved by certifica- tion agent	Reason for use	Date discont- inued use
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8. Organic Feed Storage Record

Producer

Year

Name _____

Type of Storage _____ Storage ID _____

Indicate if this storage is: organic only (✓) _____, or used also for transitional buffer or conventional crops (✓) _____

Date crop/feed stored	Type of Crop/feed	Field	Lot of purchased feed	Quantity in	Quantity out	Date cleaned and methods used
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9. Organic Livestock Outdoor Access and Pasture Record

Producer Name _____

Code: O=Organic; T=Transition/Conversion to Organic; C=Conventional.

Give date and rate of application for inputs to pastures. Indicate if the field is also used to harvest hay or other feed crops.

Code	Pasture of Stocking	year ____	year ____	year ____	year ____
O/T/C	acres rate : of animals/ time period	Crops planted and inputs applied	Crops planted and inputs applied	Crops planted and inputs applied	Crops planted and inputs applied

10. Health Care Products Inventory

Producer Name _____

Health care product	Source or brand	Date of first use	Synthetic ingredients yes (Y), no (N) or don't know (?)	Genetically engineered ingredients yes (Y), no (N) or don't know (?)	Date approved by certifica- tion agent	Reason for use	Date discont- inued use
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11. Sanitation Products Inventory

List all detergents, acid washes, sanitizers, teat dips and other cleaning products used in organic livestock housing, organic dairy milkhouse, or other locations.

Sanitation product and brand name	Reason for use	Date approved by certifying agent	Date of first use	Date discontinued use

1. If chlorohexidine is used as a teat dip, list alternative germicidal products and/or management strategies you currently use or have used in the past.

12. Individual Organic Animal Health Record

Name of Animal _____ Tag or ID _____
 or Description of Animal _____ (attach
 photograph if needed) Birth date _____ Date Animal Sold _____
 Date Animal Died _____ Cause of death _____ .
 If the animal died, did you withhold medical treatment to preserve its organic status?
 Yes () No ()

[illegible]

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13. Organic Egg Layers Monthly Flock Record

House or ID _____ Date Chicks/Pullets Placed _____
House size _____ Total of Chicks/Pullets Placed _____
Breeds _____ Outdoor access ID: _____
Outdoor access acreage: _____ Date poultry allowed outdoor access: _____

Month (✓): January _____ February _____ March _____ April _____
 May _____ June _____ July _____ August _____
 September _____ October _____ November _____ December _____

Day	Died	of Eggs	of Flats	Vaccinations, water additives, health care products used	Results	Water usage	Feed Bin Amt. in Lot
1							
2							
3							
4							
Totals							

14. Organic Meat Poultry Flock Record

House of ID: _____ Total of chickens produced: _____

Date chicks placed: _____ Bleeds: _____ Total of chicks placed: _____

Outdoor access ID: _____ Outdoor access acreage: _____

Date poultry allowed outdoor access: _____

Slaughter Date: _____

In columns for Day 1 through Day 7, record the number of birds that died on a daily basis.

Week	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Problems	Name of vaccines/ health care products used and date given	Water usage	Feed Bin Amt in Lot
------	----------	----------	----------	----------	----------	----------	----------	----------	---	----------------	---------------------------------

15. Organic Livestock Slaughter/Sales Summary

Producer: _____ Slaughter Facility _____

Facility is certified organic by _____

[illegible]

16. Monthly Organic Egg Packing Record

Producer: _____

Month (✓): January____ February ____ March ____ April____
 May ____ June ____ July ____ August ____
 September ____ October ____ November ____ December ____

Day	Total of Crate processed	Crate cracked eggs	Dozens ex large	Dozen large	Dozens medium	Best by date
1						
2						
Totals						

17. Monthly Organic Egg Sales Summary

Producer: _____

Month (✓): January____ February ____ March ____ April____
 May ____ June ____ July ____ August ____
 September ____ October ____ November ____ December ____

Date	Total of crates Ex Large, Large, Medium, Cracked	Buyer 1	Buyer 2	Buyer 3	Invoice	Sales Total
1						
2						
Totals						

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ORGANIC LIVESTOCK FARMING

The agriculture is increasingly being governed by knowledge and skills, not only in terms of production and processing but also in line with the global trends, consumer preferences and market situations. This publication pays rich tribute to ancient wisdom of agricultural production and animal husbandry; also it recognizes the contribution of modern intensive agricultural production systems, since both these systems have ensured health and welfare of human beings and animals, while mitigating hunger in their own unique ways. The changes on these lines are taking place with more rapid pace now as the means of communication like ICT are changing the dynamics of human life and businesses in different sectors. The Research and Development institutions as also the Non-Governmental Organizations, private sector and enterprising farmers in India are exploring the possibility of organic livestock production.

The organic standards concerning animal husbandry developed by the International Federation of Organic Agriculture Movements (IFOAM), USA, European Union, Codex Alimentarius Commission, Chinese organic standards and East African Standards has been covered apart from the National Standards of Organic Production (NSOP), developed by the Agricultural and Processed Food Products Export Development Authority (APEDA) under the Ministry of Commerce, Government of India. These standards are to be referred by the trainers and practitioners of organic farming in India, especially when they intend to market and particularly for exporting the products, the organic products have to be compliant to the standards of the importing countries. This book would significantly contribute towards improved understanding of organic livestock farming and help in developing a sustainable roadmap for the development of organic animal husbandry in India.

The present volume would be useful for the academicians, scientists, extension professionals, development workers and farmers engaged in the organic livestock farming.

